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INCREMENTAL COST IMPACTS OF THE 1972 FEDERAL INSECTICIDE FUNGICIDE AND RODENTICIDE ACT AS AMENDED

R. E. Seltzer, et al

Development Planning and Research Associates, Incorporated

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energy impacts
impacts on productivity
impacts on employment
impacts on competition
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INCREMENTAL COST IMPACTS OF THE 1972 FEDERAL INSECTICIDE FUNGICIDE AND RODENTICIDE ACT AS AMENDED

By
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FINAL REPORT
DECEMBER 1975

Contract No. 68-01-3181

For
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This EPA Report has been reviewed by the Office of Pesticide Programs and approved for publication. Approval does not signify that the contents necessarily reflect the views, and policies of the Environmental Protection Agency, or does mention of trade names or commercial products constitute endorsement or recommendation for use.

PREFACE

This report describes the results of a study conducted by Development Planning and Research Associates, Inc. for the Strategic Studies Unit, Office of Pesticide Programs, Environmental Protection Agency, Dr. John Charbonneau, Project Officer.

Work on this project was conducted with Dr. R. E. Seltzer as Project Leader and with Dr. Claude L. Fly and Mr. Edwin O. Schneider as key project staff.

This report was submitted in fulfillment of Contract No. 68-01-3181. Work was completed as of December, 1975.

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ECONOMIC IMPACTS - FEDERAL INSECTICIDE FUNGICIDE AND RODENTICIDE ACT OF 1972, AS AMENDED

I. INTRODUCTION

The Federal Insecticide, Fungicide and Rodenticide Act of 1972 (FIFRA), as amended (PL 92-516, 92nd Congress, H.R. 10729, October 21, 1972) provides for substantial changes in the regulations concerned with the classification, registration, application and use of pesticides in the United States.

Although the Federal Government has been concerned with the regulation of the pesticide industry for over 65 years, the principal legislative actions that have resulted in the body of regulatory acts and regulations which confront pesticide manufacturers, reformulators, applicators and users today originated with the Federal Insecticide, Fungicide and Rodenticide Act of 1947 (the basic Act).

A brief chronology of the evolution of laws and regulations affecting the development and registration of pesticides and related materials follows:

A. Evolution of Laws and Regulations Affecting the Development and Registration and Use of Pesticides and Related Materials

The regulation of the manufacture, sale or transportation of pesticides dates back to 1910 when the original Federal Insecticide Act was passed. However, the requirement for Federal registration of pesticides is of more recent origin, first required by the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) of 1947.

A brief chronology of the evolution of these laws and regulations is as follows:[1]

April 26, 1910 - Original Federal Insecticide Act.
An Act to prevent the manufacture, sale or transportation of adulterated or misbranded insecticides and fungicides. Administered by USDA.

June 25, 1938 - The revised Federal Food, Drug, and Cosmetic Act.
Enacted to prohibit the movement in interstate commerce of adulterated and misbranded food, drugs, devices and cosmetics, this law charged the Food and Drug Administration (FDA) with the responsibility of keeping poisonous

---

[1] This chronology is adapted from materials appearing in a report prepared by The University-EPA-USDA Ad Hoc Subcommittee, dated August, 1973, entitled, "The Development of Data Required for Registration of Pesticides for Specialty and Small Acreage Crops and Other Minor Uses."

insecticides, as well as insects, out of food products. It included provisions for setting tolerances for poisonous ingredients, if they could be justified, but the procedure was cumbersome and often time-consuming and expensive.

The law did not provide for advance clearance of safety of food additives. It left it up to the FDA to discover their use, and to make tests to prove them "poisonous or deleterious" to the satisfaction of the court when action was required to remove them from the market.

1945 and 1946 - Many new insecticides (organic) appeared on the market. Legal tolerances were not announced, indicating to many that the ponderous tolerance procedures of the Food, Drug and Cosmetic Act could not handle the flood of new materials. In addition, the labeling requirements of the 1910 Insecticide Act were obsolete.

June 25, 1947 - The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)
This act extended the scope of the 1910 Act to include rodenticides and herbicides and required for the first time premarketing registration of products to be shipped interstate. It thus set up the system of label claims and registration. It provided that a complete copy of the label and a statement of all claims to be made for the material must be submitted to the Secretary of Agriculture and must be approved before the material is registered for sale (in interstate commerce). It also provided a system of fees to support the procedures involved. The act was enforced by the USDA, Agricultural Research Service, Plant Pest Control Branch, Pesticide Regulation Section.

1950 - The continued flood of new materials emphasized the need for residue tolerances. According to the provisions of the 1938 Food, Drug and Cosmetic Act, supporting evidence for the tolerances had to be established at public hearings. Accordingly, hearings were started on January 17, 1950, and were completed on September 15, 1950. Such a mountain of evidence was presented that several more months were required to digest it.

1951 - Growing public concern over the addition of chemicals to food products led to the appointment of the Delaney Committee, known formally as the House Select Committee to investigate the use of chemicals in foods and cosmetics.

June, 1952 - The Delaney Committee submitted its report to the 2nd session of the 82nd Congress. The report was in three parts: (1) a majority report, indicating that present laws were inadequate and new laws were needed, (2) a minority report, indicating that present laws were adequate but needed streamlining, and (3) a supplementary report indicating that one of the most important hazards involved was in the use of pesticides in the home garden on materials intended for home consumption. It was pointed out that this particular hazard is beyond the reach of law and is susceptible only to education of the general public.

November, 1952 - The Food Protection Committee of the National Research Council published a comprehensive report, dealing with the use of chemicals in food. This report considered the present and future food needs of the nation and stressed the vital role that chemicals play in meeting these needs. It pointed out that the losses from hazards involved in using chemicals are rather minor compared to the losses involved in not using them.

March 26, 1953 - Rep. A. L. Miller introduced a bill, H.R. 4277, which provided for the regulation of pesticides and tolerances. This bill was heralded by the industry as a basis upon which a workable law could be built.

January 11, 1954 - Rep. Miller submitted a new bill, H.R. 7125, (a revised H.R. 4277 of the previous session). It was referred to the House Committee on Interstate and Foreign Commerce and became known as the Miller Pesticide Residue Amendment, since it was introduced as an amendment to the Federal Food, Drug, and Cosmetic Act.

July 22, 1954 - The Pesticide Chemicals Amendment (The Miller Pesticide Residue Amendment), amended the Federal Food, Drug and Cosmetic Act to provide for a system of fees to support the procedures involved, became Public Law 518 of 83rd Congress. It became effective for new chemicals a year from the date of signing, and was effective for tolerances established as a result of the 1950 and subsequent hearings.

It established new and more expeditious procedures for obtaining tolerances for exemptions for pesticide chemicals. Though administered by HEW, it specifically assigned to the Secretary of Agriculture the determination of usefulness of a chemical for all, any or none of the uses for which tolerances or an exemption are sought. And it required the USDA to express an opinion as to whether proposed tolerances are reasonable and whether residues are likely to result from proposed patterns of use.

September 6, 1958 - Food Additives Amendment to the Federal Food, Drug and Cosmetic Act (Public Law 929 of 85th Congress). It established procedures, principles and appeals procedures for obtaining regulations from HEW prescribing safe conditions of use for food additives. A food additive was defined as any substance the intended use of which may reasonably be expected to result directly or indirectly in its becoming a component of or otherwise changing the characteristics of any food. The law specifically excluded pesticide chemicals, pesticide residues on crops (raw agricultural commodities) and pesticide residues in processed food when such residues result from legal uses of pesticides on crops. These pesticides are regulated under Public Law 518 (The Miller Amendment).

This food additives amendment included the Delaney clause on carcinogens: no additive shall be deemed safe if it is found to induce cancer when ingested by man or animals.

March 27, 1962 - Declaration of Certain Forms of Plant and Animal Life and Viruses to be Pests. Thus, it extended the scope of the Federal Insecticide, Fungicide and Rodenticide Act to cover some kinds of pesticides not previously subject to the Act.

May 12, 1964 - An Amendment to FIFRA eliminating registration under protest. This amendment provided that the registrant could request an advisory committee or public hearing when registration of his product was refused, cancelled or suspended. The Secretary of Agriculture was also given the authority to require, by regulation, the USDA registration number of the label.

October 21, 1972 - The Federal Environmental Pesticide Control Act (FEPCA) of 1972 (1972 FIFRA as amended). It significantly amended the FIFRA of 1947 and is administered by the Environmental Protection Agency (EPA). The major provisions of this Act are as follows:

- Administered by the Environmental Protection Agency;
- Requires all U.S. pesticides to be Federally-registered or approved;
- Classified pesticides for general or restricted use, the latter--because of hazard to the individual or the environment--to be applied only by or under the supervision of certified applicators;
- Establishes State applicator certification programs (for commercial and private applicators) and cooperative enforcement programs;
- Prohibits the misuse of pesticides (any use inconsistent with the label is a crime, whether or not personal or crop injury results or residue exceeding the tolerance is found at harvest), adds civil to increased criminal penalties, and otherwise strengthens enforcement;
- Shortens administrative review procedures;
- Requires pesticide producing establishments to be registered and to regularly submit information on production and sales volume:
- Authorizes indemnification of certain owners of pesticides which are suspended, then cancelled; and
- Authorizes the EPA Administrator to establish pesticide packaging standards, regulate pesticide and container disposal, issue experimental use permits, conduct research on pesticides and alternatives and monitor pesticide use and presence in the environment.

All provisions of 1972 FIFRA as amended must be effective within four years, or by October 21, 1976.

B. Organization of the Report

The analysis of the impacts of 1972 FIFRA as amended as presented in this report includes three separate and distinct parts:

Part I -	Identification of pesticide categories, use types and geographic areas that will be most affected.
Part II -	Economic impacts solely attributable to the incremental requirements of 1972 FIFRA as amended.
Part III -	Estimates of the total costs of registration and reregistration of pesticides, including "catch-up" costs required to comply with registration requirements of 1972 FIFRA as amended.
Part IV -	Summary costs and cost impacts.
Part V -	Limitations of the analysis.

C. Scope of Work

In compliance with Executive Order 11821 and RFL 256-7, the Environmental Protection Agency is voluntarily preparing economic impact statements for its most significant regulatory actions. This study attempts to evaluate the economic impacts of 1972 FIFRA as amended on the pesticide industry, pesticide users and consumers and will describe inflationary impacts which may result.

Specific tasks included are as follows:

1. Identification of pesticide categories, use types and geographic areas that will be most affected.
2. Evaluation of economic impacts on the pesticide industry.
3. Quantification, under varying assumptions, of any cost increases to pesticide users.
4. Quantification, under varying assumptions, of any cost increases to consumers of final products.
5. The overall assessment of all costs and benefits to society attributable to the implementation of selected sections of 1972 FIFRA as amended.

PART I

IDENTIFICATION OF PESTICIDE CATEGORIES, USE TYPES AND GEOGRAPHIC AREAS THAT MAY BE MOST AFFECTED BY PROVISIONS OF 1972 FIFRA AS AMENDED

A. Pesticide Categories in the United States

Table 1 illustrates the trends in the production and value of synthetic organic pesticides in the United States, 1963-1973. Over the 11-year period, production increased a total of 69 percent and value of production rose by 236 percent. The average manufacturers' value per pound of pesticides in 1963 was $0.58 compared to $1.16 in 1973, reflecting increasing manufacturers' costs. Production rose rapidly during the early 1960's and has continued to increase, but at a slower rate, since 1966.

Sales increased by 84 percent, a net increase of 547 million pounds vs. 525 million pounds gain in production, the difference being made up from increased imports. Value of sales increased 264 percent representing increased f.o.b. manufacturers' prices and other increased costs. A particularly rapid increase was noted in both volume and value of sales 1972-1973, volume sold 1973 increasing 17.4 percent over 1972 and value increasing 23.1 percent.

Volume of U.S. exports of pesticides increased by 76 percent 1963-1973 and 99 percent 1963-1974 (Table 2). In 1974, exports totaled 674 million pounds, valued at $566.6 million. Imports of pesticides are relatively less important, about 28 million pounds in 1973 and 1974.

Table 3 shows the relative distribution of utilization and wholesale value of pesticides, 1970-1973. As seen from these data, fungicides constitute 12-14 percent of the sales, herbicides 35-37 percent and insecticides, rodenticides and other pesticides represent approximately 50 percent of the total volume of sales.

B. The Pesticide Users

The use of pesticides has become a way of life in America and everyone benefits in some way from their use. The users of pesticides can only be listed in a general way and the relative volumes used by these major categories shown. When over 35,000 products are distributed among 215,000,000 people in amounts ranging from boxcar loads down to a few grams (as in a drugstore or supermarket), any attempt at precise accounting can be time-consuming and voluminous.

Table 1. Synthetic organic pesticides: Production and sales, United States, 1963-73 1/

Year	Quantity	Change from pervious year	Value 2/	Change from previous year
	(1,000 lbs)	(Percent)	(1,000 $)	(Percent)
		Production		
1963	763,477	4.6	444,046	3.9
1964	782,749	2.5	473,815	6.7
1965	877,197	12.1	576,787	21.7
1966	1,013,110	15.5	715,362	24.0
1967	1,049,663	3.6	959,260	34.1
1968	1,192,360	13.6	1,028,469	7.2
1969	1,104,381	-7.4	953,592	-7.3
1970	1,034,075	-6.4	1,058,389	11.0
1971	1,135,717	9.8	1,282,630	21.2
1972	1,157,698	1.9	1,344,832	4.8
1973	1,288,952	11.3	1,492,770	11.0
		Sales (domestic and export)		
1963	651,471	2.8	369,140	6.6
1964	692,355	6.3	427,111	15.7
1965	763,905	10.3	497,066	16.4
1966	822,256	7.6	583,802	17.4
1967	897,363	9.1	787,043	34.8
1968	959,631	6.9	849,240	7.9
1969	928,663	-3.2	851,166	0.2
1970	880,914	-5.1	870,314	2.2
1971	946,337	7.4	979,033	12.5
1972	1,021,565	8.6	1,091,708	11.5
1973	1,198,568	17.4	1,343,581	23.1

1/ Includes a small quantity of soil conditioners.

2/ Value of production calculated: unit value x quantity; sales value as reported by the Tariff Commission.

International Trade Commission (formerly Tariff Commission), Chemical Division, "Synthetic Organic Chemicals, United States Production and Sales".

Table 2. Trends in U.S. imports and exports of synthetic organic pesticides, 1963-1974 1/

Year	Imports		Exports	
	Pounds	Dollars	Pounds	Dollars
	(millions)			
1963	3.0	1.7	338	121.1
1964	3.0	1.9	361	134.5
1965	3.0	2.0	306	133.2
1966	3.1	2.2	375	173.6
1967	6.4	5.6	411	195.7
1968	6.8	6.0	472	241.5
1969	6.0	5.5	409	203
1970	13.3	10.6	404	220.3
1971	20.7	19.6	423	251.6
1972	23.5	25.2	388	228.2
1973	28.8	32.3	596	365.5
1974	28.3	42.7	674	566.6

Source: The Pesticide Review, ASCS, USDA, 1973 and earlier issues, plus unpublished update data.

Table 3. Relative distribution of utilization and wholesale value of pesticides, 1970-1973 1/

Classes	1970		1971		1972		1973	
	Vol.	Value	Vol.	Value	Vol.	Value	Vol.	Value
	Percent							
Fungicides	14.6	7.5	14.0	7.5	12.6	7.5	12.0	8.0
Herbicides and plant hormones	35.0	57.2	33.5	57.5	34.6	57.6	37.0	56.0
Insecticides, fumigants rodenticides, conditioners	50.4	35.3	52.5	35.0	52.8	34.9	50.0	35.0
TOTAL (millions)	880.9#	$870.3	946.3#	$979.1	1,021.6#	$1,091.7	1,198.6#	$1,343.6

1/ Source: Table 3, 1973 Pesticide Review, ASCS, USDA plus unpublished update data.

The following outline serves to point out the wide variety of uses and users:

1. The Users and Uses - General

(a) Plant Growth Management

Crop Production

Field crops and pasture
Orchards and vineyards
Home gardens
Commercial vegetable farms

Fiber Production

Field crops
Forestry

Ground Maintenance

Military installations
Parks & recreation areas
Transport & utility areas
Lawns and ornamental sites

Greenhouses

Florists
Nurseries
Experimental

(b) Industrial Commercial and Other Indoor Uses

Industrial & Commercial

Product protection
Wood products preservation
Health and Sanitation

Other Indoor

Institutional
Household
Governmental
Public & Business Bldgs.

(c) Animal - Fish - Poultry - Wildlife Mgmt.

Livestock Mgmt.

Feedlot pests
General livestock uses
Predators
Rangeland control

Poultry Production

Health
Rodents and insects
Predators

Aquatic Environment

Aquatic weeds
Species control

Wildlife Environment

Diseases
Pests

2. Quantities Used by Different Groups

No attempt is made here to expand in detail within all these categories. The production of food and fiber utilized 59 percent of all active ingredients according to the 1973 Pesticide Review.[1] Therefore, the agricultural uses will be treated in more detail. Other uses contribute to health, to better living conditions, to recreation, to an improved cultural environment and to pest control in industrial and commercial enterprises. General data in Table 4 show an approximate distribution of total use.

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[1] The Pesticide Review - 1973, Agricultural Stabilization and Conservation Service, U.S. Department of Agriculture

Table 4. Distribution of pesticides use in 1971 among user groups [1/]

Pesticide Users	Fungicides	Herbicides	Insecticides	All Other	Total Active Ingredients	A.I.	Other Materials			
							Sulfur	Petroleum	Carriers	Preservatives
	---------- millions of pounds				----------	(%)	----------millions of pounds----------			
The Agricultural Sector	41.73	227.91	169.77	54.71	494.109	59.00	112.09	221.53	(see below)	(see below)
The Household Sector	(33.0)	(NA)	103.83	(NA)	135.39	16.25	(NA)	(NA)	(NA)	
Institutional, Industrial & Commercial Sector	10.00	36.90	15.40	28.80	91.10	10.94				46.0 (dry)
Wood Products and Preservation	46.00	-	--	-	46.00	5.52		(gal) 81.12 = 474.55		1,017.5# 138.0 (gal)
Transportation on the Utilities Sector	--	42.15	--	--	42.15	5.06				
The Governmental Sector		(NA)	(NA)	(NA)	24.25	2.91				
Undistributed	(24.27)	--	--	--	--	(2.91)			(557.0)	
States Totals	155.00	307.00	289.00	83.51	833.00	100.00	(150.±)	696.09	557.0	(1,063.5)

1/ Data Sources: 1972-1973 Pesticide Review, USDA-ERS-Agri. Econ. Report #252, July, 1974 and EPA 540/1-74-001,1974.

Note: Figures in parentheses are estimated.

a. Data on agricultural usages are fairly complete and, since 59 percent of the pesticide active ingredients are used in agricultural production, gives a fairly good picture of the distribution among classes of pesticides.

b. Household uses accounted for 16 percent of the active pesticide ingredients distributed to users in 1971, chiefly insecticides, fumigants, disinfectants, fungicides and repellents. This level of use checks fairly well with an unpublished study made in New Jersey and Connecticut by Kaplan 1/ which showed 15.9 percent of the pesticide active ingredients were used in and around homes. Agricultural usage was 50 percent of the total in New Jersey and 65 percent in Connecticut; Government use was 3.9 percent in the two states vs. 2.9 in the U.S. as shown in Table 4. Industrial use was 18 percent as compared to 21.5 percent in Table 4.

c. The Industrial-Commercial-Institutional Sector appears to be second in total usage of pesticides accounting for about 22 percent of the total. Maintenance of sanitary, healthful working conditions accounts for a goodly share of this; however, product preservation, especially wood products, uses large quantities. Transportation and utilities systems used over 42 million pounds of herbicides in 1971 to control vegetation along right-of-way areas. In addition, over one billion pounds of liquid preservatives (chiefly tar and creosote) and 40 million pounds of other preservatives were used by this sector in various ways.

d. Governmental uses accounted for only 3 percent of the total, as drawn from these studies. Military installations, central agencies locations, government parks, range and forest areas were the prime users.

C. Regions of Greatest Impact

Tables 5 through 9 show the distribution of crops and uses of pesticides by the 10 Agricultural Regions described in ERS-USDA Agric. Econ. Report 252, July, 1974. 2/

While the greatest total use of pesticides is in the Corn Belt, roughly 104 million pounds, there are much higher concentrations of sensitive and high value crops in other regions. The Pacific Region has a high concentration of citrus, apples, vegetables and other fruits and nuts, the Southeastern Region has high production of citrus, other fruits and nuts plus such crops as peanuts and cotton. Large acreages of cotton, a large user of pesticides, are in the Southern Plains and the Delta States Regions. Also, the Lake States raise large quantities of apples, other deciduous fruits and such crops as berries, cranberries and vegetables. Considering the relative impact on these high value, more sensitive crops and the chances that restricted use or minor use chemicals might become unavailable, costly or delayed in availability, one may expect these regions to

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1/ Kaplan, Unpublished Report on Pesticide Usage Study, New Jersey Epidemiologic Studies Program, April 9, 1975.

2/ Farmers Use of Pesticides, Economic Research Service, U.S. Department of Agriculture, Agricultural Economic Report 252, July 1974.

Table 5. Summary of cropland distribution by regions

REGIONS	TOTAL ACRES	% Potential CROPLAND 1/	ACRES CROPLAND (Potential)	ACRES REPORTED (cropland harvested)	%
PACIFIC	207,274,240	13.0	26,945,600	13,815,000 2/	51.27
MOUNTAIN	551,722,880	9.1	50,206,800	25,890,000	51.56
NORTHERN PLAINS	196,641,920	62.2	122,311,300	70,805,000	57.89
SOUTHERN PLAINS	215,844,480	26.9	58,062,100	30,850,000	53.13
LAKE STATES	127,000,320	43.2	54,864,100	34,760,000	63.36
CORN BELT STATES	166,328,960	50.7	84,328,800	79,148,000	93.86
DELTA STATES	95,579,520	20.2	19,307,000	16,392,000	84.90
APPALACHIANS	128,142,720	20.1	25,756,700	16,629,000	64.56
SOUTHEAST	128,064,000	14.2	18,185,000	11,899,000	65.43
NORTHEAST	116,514,560	21.9	25,516,700	10,272,000	40.26
U.S. TOTALS 3/	1,933,113,600	100.0	485,484,000	313,680,000	64.61

1/ This value needs rechecking as the values in percentages came from an economic survey report by R. C. Otte, SCS National Land Use Policy, 1973 and are not verified against the USDA-SCS National Inventory latest reports.

2/ Sources are ERS-USDA Ag. Econ Report 252, July, 1974, 1974 Annual Summary of Statistical Reporting Service CrPr 2-1(75), Jan. 16, 1975 and USDA Annual Crop Reports Summaries.

3/ Data from 48 states...Alaska and Hawaii are omitted. Regions include the following states:

Pacific - Calif., Ore. and Washington
Mountain - Ida., Mont., Wyo., Colo., Utah, Nev., Ariz., New Mexico
Northern Plains - N. Dak., S. Dak., Neb., Kansas
Southern Plains - Okla., Texas
Lake States - Minn., Wis., Mich.
Corn Belt States - Ia., Mo., Ill., Ohio
Delta States - Ark., La., Miss.
Appalachian States - Ky., Tenn., W. Va., Va., N. Car.
Southeast - S. Car., Ga., Ala., Fla.
Northeast - Md., Del., N. J., N. Y., Pa., Conn., R. I., N. Hamp., Vt., Mass., Me.

Table 6. 1971 Pesticide use by agriculture in ten regions of U.S. (000 pounds - active ingredients)

Regions	All Pesticides	Fungicides[1] (Adj.)	Herbicides (Adj.)	Insecticides	All Others & Uses	Miticides	Fumigants	Defoli-& desic-cants	Rodenti-cides	Growth Regula-tors	Repel-lents
Pacific	55,149	7,271	12,824	13,313	21,741	1,054	11,859	5,282	2	169	—
Mountain	14,675	316	7,573	5,941	945	43	369	105	<.5	304	—
Northern Plains	39,026	527	28,475	8,252	1,772	—	1,381	--	<.5	54	—
Southern Plains	45,071	843	15,248	20,355	8,625	2	211	7,167	<.5	—	—
Lake States	36,091	1,370	29,990	4,731	118	10	—	--	<.5	19	—
Corn Belt	103,568	5,585	77,147	20,245	591	28	5	344	<.5	95	—
Delta States	64,186	211	24,538	35,538	3,899	—	38	3,290	—	--	—
Northeast	21,947	7,481	8,179	6,051	236	136	30	--	8	64	—
Appalachian	36,140	4,000	12,622	10,893	8,625	27	3,418	178	--	3,695	13
Southeast	78,033	14,120	11,310	44,450	8,153	721	3,653	1,352	--	1,151	—
U. S. Totals[3]	494,109[2]	41,727	227,906	169,770	54,706	2,021	28,959	17,718	15	5,551	13

[1] Sulfur not included is equal to 112,453,000 pounds. Regional distribution is not shown.

[2] Petroleum not included is equal to 221,528,000 pounds. Regional distribution is not shown.

[3] All U. S. Pesticide Active Ingredients uses were shown as 833,000,000; agriculture is 59%.

Source: ERS, USDA, AER No. 252.

Table 7. Some minor crops grown in U.S. 1/ (000 acres)

Crop	N. E. 1	Appal. 2	S.E. 3	Delta 4	Corn Belt 5	Lake States 6	North Plains 7	South Plains 8	Mt. States 9	Pacific 10	U. S. Total
Broom Corn	-	- (others = 1.9)				-	-	37.1	68.4	-	107.3
Castor Beans	-	- (others = 0.8)				-	-	35.6	2.1	-	38.5
Chufas	-	-	0.15	0.06	-	-	-	-	-	-	0.2
Dill (oil)	-	- (all others = 0.3)			-	-	-	-	-	2.7	3.0
Hops	-	- (all others = 1.5)			-	-	-	-	2.9	21.2	25.7
Mint (oil)	(others = 0.2)				13.6	16.6	-	-	7.8	70.3	108.4
Popcorn	0.4	9.2	-	-	111.6	3.0	27.1	-	0.7	-	157.2
Sunflower seed	-	-	0.5	-	-	65.6	71.3	0.7	-	3.4	143.5
Wormseed (oil)	0.03	-	-	-	-	-	-	-	-	-	0.03
Others (Miscl.)	11.0	6.8	4.8	3.3	7.8	25.8	6.2	7.9	6.5	4.3	83.2
U. S. Totals	11.4	16.0	5.7	3.4	133.0	111.0	104.6	81.3	88.4	101.9	672.0

1/ Taken from Table 62, Pg. 81, "Crops, Nursery and Greenhouse Products," U.S. Dept. Commerce, Vol. II, June, 1973 (1969 and 1973 data).....48 states.

Table 8. Acres of citrus, fruits and nuts by regions1/

Regions No.	Regions Name	Citrus	Apples	Other deciduous fruits	Other fruits nuts	Total
		acres				
1	Northeastern	0	168,895	63,965	89,600	322,460
2	Appalachian	0	76,405	17,556	14,800	108,761
3	Southeastern	886,141	5,524	64,820	191,900	1,148,385
4	Delta States	932	2,545	8,367	81,300	93,144
5	Corn Belt	0	42,880	16,881	16,000	75,761
6	Lake States		80,962	101,201	38,200	220,363
7	North Plains		2.488	2,365	300	5,153
8	South Plains	31,687	2,104	12,410	146,800	193,000
9	Mountain	39,532	20,381	21,182	19,700	100,795
10	Pacific	223,408	122,742	435,177	983,000	1,764,327
48 States	Total	1,181,700	356,031	743,654	1,581,600	4,032,149

1/ Tables compiled by ERS-USDA.

Table 9. Regional distribution of harvested crop acres 1972-73 (000 acres)

Crop	N.E. 1	Appal. 2	S.E. 3	Delta 4	Corn Belt 5	Lake States 6	North Plains 7	South Plains 8	Mt. States 9	Pacific 10	U.S. Total
Corn - grain	2,161	3,556	3,050	234	31,690	9,300	10,330	727	1,836	297	63,181
Corn-silage	1,682	631	190	65	1,380	2,059	2,195	127	610	262	9,201
Sorg. grain	-	138	80	205	547	-	6,162	7,646	788	287	15,853
Sorg. silage	-	63	40	77	58	-	432	121	40	11	842
Rice	-	-	-	1,215	5.2	-	-	549	-	401	2,170.2
Wheat (all)	584	675	339	335	3,607	2,605	24,201	8,660	8,559	4,304	53,869
Other grains	1,128	458	356	95	2,647	5,320	8,436	1,266	3,983	1,804	25,493
Cotton	-	616	1,190.5	2,835	173	-	-	5,726	405	942	11,853
Peanuts	-	269	783	10	-	-	-	427	8	-	1,497
Potatoes	250.7	53.0	49.2	4.3	22.7	176.4	145.6	18.7	391	193.5	1,305.1
Soybeans	586	4,573	3,424	8,980	29,260	5,324	3,024	625	-	-	55,796
Sugar beets	-	-	-	-	29.6	218	183	21	389	373	1,218.5
Tobacco	44.6	672.7	141.8	0.2	17.1	10.2	-	-	-	-	886.6
All hay & for.	3,380	4,753	1,574	1,899	9,458	8,526	15,473	4,675	8,323	3,682	61,748
All other field crops	42.7	35.6	279.6	385.0	12.0	611.0	212.0	28.1	400.2	330.2	2,336.4
Citrus	-	-	883.1	0.9	-	-	-	31.7	39.5	223.4	1,123.5[4]
Apples	168.9	76.4	5.5	2.5	[illegible].9	81.0	2.5	2.1	20.4	122.7	524.9[4]
Other dec. fruits	64.0	17.6	64.8	8.4	16.9	101.2	2.4	12.4	21.2	435.2	744.1[4]
Other fruit & nuts	89.6	14.8	191.9	81.3	16.0	38.2	0.3	146.8	19.7	933.0	1,581.6[1]
Vegetables	411.5	134.9	401.1	51.5	241.1	610.7	1.2	232.5	158.0	928.3	3,170.3
Other minor crops	11.4	16.0	5.7	3.4	133.0	111.0	104.6	81.3	88.4	101.9	661.4
Sum.-all crops*	10.6	18.0	13.1	16.5	79.4	35.7	70.9	31.1	26.1	15.7	317.0
% cropland in ea. region	21.9	20.1	14.2	20.2	50.7	43.2	62.2	26.9	9.1	13.0	-[2]
Calc. total croplands*	25.5	25.8	18.2	19.3	84.3	54.9	122.3	58.1	50.2	26.9	485.5[3]
Regional totals*	116.5	128.1	128.1	95.6	166.3	127.0	196.6	215.8	551.7	207.3	1,933.1

[1] Statistics from USDA and U.S. Dept. Commerce Reports.

[2] Percentages by R. C. Otte from S.C.S. Land Use Policy Review, 1973.

[3] USDA Statistics & USDA-SCS National Inventory Surveys indicate that total croplands may include as much as (1) Planted but not harvested-15,000,000-30,000,000; Idle or fallow 45,000,000-50,000,000 and Cropland Pasture-65,000,000 acres; Native pasture and range and grazed woodlands may occupy another 775,646,000 acres.

[4] Data from Washington 5/12-75 by phone from Paul Andrilenas, ERS,USDA.

* Note: Sum.-all crops, Calc. total croplands and Regional Totals - x 10^6

be most affected. It would be difficult to place the regions in priority order as each may have its own place in the agricultural sector. On the basis of total acreage of high-value or sensitive crops produced, they would rank in the following order: (1) Southeast (2,282,300), (2) Pacific (2,023,000), (3) Appalachian (1,171,000), (4) Lake States (813,000), (5) Northeast (678,000) (Table 9).

A ranking made by state specialists did place the Corn Belt states high on the list as well as the Delta states. The lowest and least mentioned regions were the Northern Plains and the Mountain States, even though (see Table 5) the Northern Plains has the largest potential crop acreage and second highest harvested acreage and the two regions combined have nearly 30 percent of the total lands in the 48 states (Table 5). Producing dominately small grains and hay, these two regions have less need for concentrated pesticide usage (Table 9).

Ranked according to total pesticides usage, the top five regions would be in order: Corn Belt, Southeast, Delta, Pacific and the Southern Plains (Table 6). The Southeast Region is the greatest user of fungicides (cotton, tobacco, and fruits); the Corn Belt the greatest user of herbicides (corn and soybeans) and the Southeast leads also in the use of insecticides. The Southern Plains leads in the use of defoliants and desiccants (chiefly on cotton and sorghums) with the Pacific Region second in quantity of use. The Pacific leads in the use of fumigants with the Appalachians and Southeast in a near-tie for second place.

Again, studying minor crops which could be more severely affected by withdrawals, delays in registration [illegible] too severe restrictions in pesticide usuage, the ranking could be C[illegible]lt, Lake States, North Plains, Pacific and Mountain States (See Table [illegible] In this case, one crop, broomcorn, is responsible for putting the [illegible]ain States into the top five and popcorn and sunflower seed produc[illegible] acreage-wise, places the Northern Plains into this group. The monetary value is not given here--only acreages of minor crops.

Fruits and nuts are relatively expensive crops and require large amounts of pesticides (43,512,000 pounds or 8.8 percent of the total). Ranked in order by total acreages are Pacific, Southeast, Northeast, Lake States and South Plains (Texas) (see Table 8).

Out of all this, one might say the top two most likely impacted regions would be the Pacific and Southeast with the Northeast and Delta states and the Corn Belt and Lake states competing for second and third place groupings. The Southern Plains and Appalachian states while having critical and special problems of their own would likely be in the next lower bracket. The Mountain States and Northern Plains states pose by far the fewest problems of any of the agricultural regions. Thus, the two regions likely to be most severely impacted and the two regions likely to be least affected seem fairly apparent.

D. Potentials for Expansion of Agricultural Lands and Pesticide Use

The everpresent problem of man, land and food and the increasing pressure for expanded food production forecasts an increasing need for agricultural chemicals. Conferences on these problems are so numerous and the cry for action so demanding that a hard look at some basic facts is needed to obtain a true perspective of the problem. Several sets of data are presented in the following tables which will enable one to see the potentials for expansion of food production in the United States and in the world.

1. Present and Potential Land Use in the United States

Table 10 summarizes the present land uses and available land areas for the United States and its possessions. It is clear that the cropland portion of our resources is limited and occupies only 20.5 percent while range and pastured woodland occupies 42.6 percent of the total land area. There is abundant land for raising livestock that will not be used for crops because of topographic or climatic restrictions.

A large part of our land is suitable only for meat production. Major pest control programs need to consider the needs for nearly one billion acres of grazing lands and nearly one billion acres of trees (1/3 overlap) in contrast to less than one-half billion acres of cropland. Table 13 shows however that very minor amounts of pesticides are used on these vast resources. Also, a pest control program for cropland in Alaska with only 3/10,000 percent is meaningless but would be really significant in Puerto Rico where 62 percent is cropland. Integrated pest control programs need to consider these basic facts as well as the specific pest or crop.

2. Potential Usability of Land Resources

The USDA Soil Conservation Service has for many years used a system of classifying land as to its use capabilities, coupling this with the needed conservation and environmental protection measures needed to obtain maximum sustained use with minimum erosion losses. Table 11 shows this classification of the United States, its possessions and territories. Classes I, II and III constitute the lands suitable for continuous cultivation with increasingly difficult management required from I to III; Class IV is marginal for cropland use but can be intermittently used under very careful control; V, VI and VII are classes suited only to grass or free cover with VII being the most hazardous to use. Class VIII is waste land or non-productive of agricultural goods. Only 674 million acres fall in the first three classes or 29.7 percent and, of this, the top grade land of Classes I and II is only 15.5 percent or about 1/7 of our land resources. It is on this land with intensive farming practices that the United States' production of food and fiber is the envy of the world.

Table 10. Land use distribution in the United States, Island possessions and trust territories[1]
(acres)

AREAS	TOTAL LAND AREA	CROPPED LAND	PASTURE & RANGE	WOODLANDS GRAZED	FOREST LAND NOT GRAZED	URBAN-IND. TRANSPORT	WASTE LANDS	WATER AREAS
U. S. 48 STATES	1,896,958,720	465,000,000	633,000,000	301,000,000	314,958,720	123,000,000	60,000,000	37,287,680
ALASKA	359,506,680	12,000	363,000	30,000,000	119,031,680	100,000	210,000,000	12,797,200
Hawaii	4,100,000	465,000	796,000	300,000	939,000	350,000	1,250,000	11,360
PUERTO RICO	2,199,000	1,367,000	152,000	75,000	150,000	225,000	230,000	22,000
GUAM	131,000	35,000	54,000	7,000	25,000	5,000	5,000	4,680
SAMOA	48,640	15,000	-- ---	5,000	24,640	2,000	2,000	360
VIRGIN ISLANDS	84,000	16,000	21,000	7,000	20,000	6,000	14,000	1,126
CORN ISLANDS	1,280	200	180	100	200	500	100	- ---
CANAL ZONE	237,440	5,000	5,000	- ---	192,440	25,000	10,000	116,480
TRUST TERRITORIES	5,375,760	20,000	- ---	835,000	1,000,000	20,000	3,500,760	54,000
TOTALS	2,268,642,520	466,935,200	634,391,180	332,229,100	436,341,680	123,733,500	275,011,760	50,294,886

Grand Total = 2,318,937,406 acres.

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[1] No complete source of data was available for all items, particularly for the islands, and estimates are based on such data as was available. Sources used include: The 197_ World Almanac; 1967 USDA Land Resources Inventory;

An Inventory of Land and Water Resources by C.H. Wadleigh and AA Klingebiel, ASA Special Publ. 7,1966; Major Land Uses of the United States, ARS-USDA AIB 168, 1957; Basic Natural Resources Considerations in Land Use by W. M. Johnson, SCSA Land Use Policy Report, 1973.

Table 11. Distribution of land use capability classes in the states, possessions and trust territories[1]
(Areas in 1000s of acres)

AREAS ●●●●●●●●●●●	TOTAL LAND SURFACE	CLASS I	CLASS II	CLASS III	CLASS IV	CLASS V	CLASS VI	CLASS VII	CLASS VIII	WATER SURFACE
UNITED STATES (48)	1,896,958.7	51,590.0	300,768.7	319,947.9	225,895.9	45,768.8	415,687.6	477,299.8	60,000.0	37,287.7
ALASKA (49th)	359,506.7	- —	5.0	10.0	20.0	40.0	58,800.0	90,632.7	210,000.0	12,797.2
Hawaii (50th)	4,100.0	10.0	50.0	500.0	50.0	240.0	1,000.0	1,000.0	1,250.0	11.36
PUERTO RICO	2,199.0	20.0	60.0	787.0	500.0	50.0	200.0	352.0	230.0	22.0
GUAM	131.0	— -	5.0	25.0	10.0	5.0	40.0	41.0	5.0	4.68
SAMOA	48.64	— -	— -	10.0	5.0	1.0	5.64	25.0	2.0	0.36
VIRGIN ISLANDS	84.0	— -	— -	10.0	10.0	5.0	20.0	25.0	14.0	1.126
CORN ISLANDS	1.28	— -	— -	— -	— -	— -	0.59	0.59	0.1	- —
CANAL ZONE	237.44	— -	5.0	20.0	20.0	20.0	62.0	100.44	10.0	116.48
TRUST TERRITORIES	5,375.76	— -	— -	10.0	10.0	5.0	500.0	1,350.76	3,500.7	54.00
TOTALS	2,268,642.52	51,620.0	300,893.7	321,319.9	226,520.9	46,134.8	476,315.8	570,826.2	275,011.8	50,295.00

FOOTNOTES: [1] Specific data is available for non-Federal lands in the 48 states. All other values are adjusted from general information on land use, relative character of the land areas and geography...unverified.

Top-grade land (Classes I + II) is estimated at 15.5% of the land area; lard non-usable for food or fiber is estimated at 20%; The maximum cropland (Classes I + II + III) is estimated to be reduced by urban-industrial development, farm wastage, idle lands, cropland pasture to leave about 500 million acres as potential; deducting 320 M. now harvested, leaves 180 M. acres as maximum cushion for expansion of crop acres in the future.

Table 12. Present land use in United States and possessions by types of use and land classes (acres X 1,000)

TYPES OF LAND USE		LAND USE CAPABILITY CLASSES (USDA SCS)								
		CLASS I	CLASS II	CLASS III	CLASS IV	CLASS V	CLASS VI	CLASS VII	CLASS VIII	TOTALS
TOTAL CROPLAND	A.	27,343.3	189,798.4	148,101.3	49,740.0	1,722.0	14,953.7	5,924.7	....	437,583.4 1/
	B.	41,225.6	189,858.4	154,487.1	55,740,0	1,845.0	17,779.1	6,000.0	....	466,935.2 2/
Cropped and Harvested	A.	23,343.3	162,798.4	109,517.9	28,740.0	222.0	2,953.7	424.7	.....	325,000.0
	B.	35,200.00	164,195.0	114,240.0	32,200.0	235.0	3,500.0	430.0	.....	350,000.0
Cropland Pasture	A.	3,000.0	19,000.0	18,000.0	9,000.0	1,000.0	7,000.0	5,000.0	.....	65,000.0
	B.	...(no estimate)								
Idle or Fallow	A.	1,000.0	8,000.0	20,583.4	12,000.0	500.0	5,000.0	500.0	......	47,583.4
	B.	1,500.0	8,500.0	21,500.0	13,500.0	500.0	6,000.0	500.0	....	52,000.0
GRASSLANDS	A.	3,661.9	43,571.7	65,380.4	54,137.9	10,762.5	166,627.3	139,229.7	2,274.2	485,645.6
	B.	4,432.9	48,736.6	67,380.4	73,827.9	11,533.7	265,000.0	163,479.7	(excluded)	634,391.2
WOODLANDS Grazed	A.	3,619.0	43,570.0	77,011.0	57,000.0	(n.e.)	51,300.0	50,000.0	.....	290,000.0
	B.	4,319.0	48,735.0	77,872.9	76,500.0	500.0	63,802.2	60,499.2	.....	332,229.1
FOREST Not Grazed	A.	0.5	1.7	822.8	521.6	28,843.5	88,867.9	142,192.0	6,538.1	448,988.1
	B.	1.0	2.5	1,383.5	1,345.4	30,411.1	109,214.0	293,984.2	(excluded)	436,341.7
OTHER (Urban, Industrial, Parks, Transportation, Homes)	A.	1,570.5	13,536.3	20,019.9	7,781.6	1,722.0	7,263.2	8,887.0	18,429.7	
	B.	1,641.5	13,561.2	20,196.0	19,107.6	1,845.0	20,520.5	46,863.1	(excluded)	123,734.9 3/
WASTELANDS...(Includes rocks, barren areas, dunes, lake & sea shores, marshes, icelands, tundra, etc.)									275,011.8	275,011.8
INLAND WATER AREAS ...(estimated inland water areas including permanent streams and lakes)......										50,295.0
TOTAL LAND AREAS	A.	36,195.2	290,478.2	311,335.4	169,181.1	43,050.0	277,712.1	296,233.4	27,240.0	1,452,873.0
	B.	51,620.0	300,893.7	321,319.9	226,520.9	46,134.8	476,135.8	570,826.2	275,011.8	2,268,642.5

FOOTNOTES:-

1/ Based on the national Soils Inventory of privately owned lands, USDA Bull.317,1962; Wadleigh & Kilingebiel, ASA Spec. Publ.7,1966; A. A. Klingebiel, Proc. 16th Agr. Res. Institute, 1967; and USDA Agricultural Handbook 455; 1973.

2/ Extrapolated from above to cover all U.S. lands in states and possessions using World Almanac; Land Use by W. M. Johnson, SCSA Land Use Policy Report, 1973; ARS-USDA AIB 168, 1957 and other sources.

3/ These lands not further divided so acres of parks, wilderness areas having some livestock or wild-life use are not differentiated.

Table 13. Present land use, maximum potential land use and estimated probable land use by 1985-2000

LAND USE CROPLAND (total)	PRESENT LAND USE		MAXIMUM CROP USE		PROBABLE CROP USE		CHANGES IN USE	
	acres X 10^6	%	acres X10^6	%	acres X10^6	%	acres X10^6	%
CROPLAND (total)	466.9		700.0		600.0		186.6	+ 3997 1/
Cropped	350.0	15.09	525.0	22.64	450.0	19.40	100.0	+28.57
Idle + Fallow	30.0	1.30	50.0	2.16	50.0	2.16	20.0	+66.67
Cropland Pasture	65.0	3.75	125.0	5.39	100.0	4.31	35.0	+53.84
,,Harvested	313.7	13.53	472.5(-10%)	20.37	405.0	17.47	91.3	+29.10
PASTURE & RANGE	634.4	27.36	524.3	22.61	549.3	23.68	85.1	-13.41 2
GRAZED WOODLAND	332.2	14.32	229.7	9.90	279.7	12.06	52.5	-15.80
FOREST(Not Grazed)	436.4	18.82	395.6	17.06	395.6	17.06	40.8	- 9.34
URBAN-Industrial Trans.,other	123.7	5.33	144.0	6.21	144.0	6.21	20.3	+16.41 4
WASTELANDS	275.0	11.86	275.0	11.86	275.0	11.86	0.0	0.0 3
WATER AREAS	50.3	2.17	50.3	2.17	50.3	2.17	0.0	0.0
TOTALS (U.S.& Possessions)	2,318.9	100.0	2,318.9	100.0	2,318.9	100.0	.....	.....

FOOTNOTES:- 1/ Future changes to adjust land use to properly usable classes of land and to conserve and protect soil resources would envisage retirement of 53,494,000 acres of Land Classes IV, V,VI and VII and the breakout of 186.6 million acres of which 150 million would be of Land Classes I-III and 36.6 would be new Land Class IV lands which had not been eroded. 5/

2/ Pasture and range reductions would be partially offset by retirement of the above lands plus the increase in more productive cropland pasture.

3/ Wastelands are retained as a single figure, however, it may be presumed that some will be used as parks and wilderness areas...some may be reclaimed.

4/ Various estimates indicate that nearly two million acres per year may be diverted from agriculture into non-productive (agriculturally) lands and that about one-half may include cropland classes I-III.

5. According to the U.S. Soil Conservation Service, surveys made in mid 1974 showed a total of 8,881,873 acres converted to cropland from other uses. Of this 3,568,977 acres were grasslands, 438,285..woodlands and 4,874,611 were previously retired or reserve croplands. Out of this total there were 1,614,032 acres of inadequately treated Class IV lands and lands in Classes V, VI and VII which would eventually have to be retired as unsuitable for continuous cultivation, leaving a net gain in croplands of 7,267,841 acres. SCS estimates that this conversion resulted in soil erosion losses of 59.3 million tons above that which would have occured if the land had not been converted to cropland.

3. The Present Use of Land Classes in the States

In spite of our enviable record, however, we have not made the best use of our land resources in harmony with their use capabilities. The silt-laden streams are evidence of continuing erosion where conservation practices either have not been applied or are inadequate. A look at Table 12 will shed light on this situation. In the first place, not all cropland is planted and harvested: of the 437,583,400 acres shown as cropland, only 325,000,000 were indicated as harvested in 1967 (317,000,000 in 1972), 65,000,000 was planted to pasture crops and 47,583,000 was fallow. Also, 22,600,000 of Classes V, VI and VII were being tilled and 49,740,000 acres of Class IV were being tilled. All of these present difficult problems of management and contribute to wind and water erosion. For best use of the land there needs to be a shift of 22.6 million acres of land not suitable for crops and say 30 million of the Class IV lands to grass or tree production.

But because of the pressure for more production, the U.S. Department of Agriculture released in 1973-76 60,000,000 acres of land, which had been in grass and trees, for increasing the acreages of grains, feed crops and soybeans.

4. Potentials for Expansion of Croplands

As shown in Table 13, we face the need to retire to grass or trees about 53.5 million acres of poorer lands. However, we have enough lands in Classes I-III and new lands in Class IV to provide replacement and more. Our maximum potential is about 700 million acres but a probable cropland total by 1985-2000 A.D. is 600 million with 450 million actually cropped or a net increase of about 28.5 percent.

It is this net increase that will exert an expansion on the pesticide industry. Using the present (1971-72 data) level of usage on an acreage basis, this would mean an increase of 156,800,000 pounds of pesticides in the agricultural sector alone by 1985.

Depending on how successful our integrated pest control programs are, this could be decreased considerably. The next Table, 14, shows that we are actually treating about 47 percent of the cultivated land. (This table is subject to much more detailed analysis and is only indicative, not absolute). However, increased pesticide use could result both from bringing in new land and from the need to expand usage on our present land. Both deserve consideration in planning future use and regulation of pesticides in agriculture.

5. Worldwide Potentials for Expanding Cropland

A final Table, 15, is included here to point out that the rest of the world has far more resources than the United States but is much less efficient in their use.

Table 14. Estimates of percent of 1971 crops treated with pesticides

Crop	Total Crop Acres x 1000 A.	Pesticide Use 1/		Max. Use 4/	Accum. Max.	Estimated Percent At a Reasonable Use		Estimated Treated Land 2/	
		Total #x 10³	# p/A	Avg. Chem. Acre x 1000	All Ingredients of 1 Class Acre x 1000	% by Max. Chem.	Est. No. Repeats	Avg. lbs. per trip	Est. %
Corn	72,382	127,035	1.76	35,993 h	80,384	50.0%	2	1.11	80%
Cotton	11,888	127,040	10.61	6,384 i	17,990	53.0%	4	2.94	90%
All fruits & nuts	3,223.1	100,497	31.18	1,245 f	5,413	46.0%	5	7.0	90%
(Alfalfa	27,787)								
Hay (All forage) (Cropland pasture...65,000)	61,748	2,903	0.047	480 i	2,776	1.7%	2	0.5	5%
Range and pasture	(775,646)	8,669	0.01	5,988 h	7,532	0.7%	1	1.0	1%
Peanuts	1,497	40,764	27.25	1,164 h	2,043	77.8%	5	6.0	90%
Potatoes	1,305.I	9,072	6.95	517 h	998	40.0%	3	3.0	70%
Rice	2,170	7,985	3.68	1,758 h	2,646	81.0%	2	2+	85%
Sorghums	16,695	11,538	0.69	3,395 h	11,525	20.0%	2	1.25	30%
Soybeans	55,796	42,140	0.75	9,152 h	37,634	16.0%	2	0.75	50%
Sugarbeets	1,217.5	2,977	2.45	242 h	1,539	20.0%	2	2+	60%
Tobacco	888.6	14,317	16.11	716 m	954	81.0%	5	3.4	95%
Wheat	53,869	14,771	0.27	19,268 h	25,505	36.0%	1	0.75	36%
Other grains	25, 493	12,873	0.50	7,504 h	12,512	30.0%	1 1/3	0.75	50%
Misc. Crops	2,336.4	14,202	6.07	814 h	3,139	33.0%	3	2.7	75%
Vegetables	3,170.8	32,991	10.40	699 i	3,160	28.0%	4	3+	85%
Totals 3/ (cropland	313,680.0	3/ 588,578	1.79	—	—	—	2	2.0	47%+

1/ Active ingredients including sulfur but not petroleum.

2/ The average application per trip is estimated from principal chemicals used and their recommended rates. Further study is needed here to check average number of applications and average rate for all chemicals used.

3/ Excluding pasture and range, fallow and idle and cropland pasture.

4/ Symbols: h = herbicides, f = fungicides, i = insecticides, m = miscellaneous chemicals.

Table 15. World population/land ratios and arable lands per capita[3]

REGION	POPULATION (millions)	World %	GROSS AREA acres X 10⁶	World %	PRESENT ARABLE LAND acres X 10⁶	World %	GRASSLANDS acres X 10⁶	World %	POTENTIAL CROPLAND acres X 10⁶	World %	Acres: per capita
NORTH AMERICA [1]	237.0	6.52	4,733.5	13.95	566.0	11.95	688.0	10.8	350.0	13.6	3.6
LATIN AMERICA	265.0	7.29	5,663.5	16.69	252.0	7.2	913.0	14.4	850.0	13.60	3.2
WESTERN EUROPE	344.4	9.47	932.3	2.70	2.0	7.0	140.0	2.2	280.0	4.48	0.8
E. Europe + USSR	360.0	9.90	6,208.0	18.29	684.0	19.8	967.0	15.2	1,495.0	23.92	4.15
AFRICA	344.5	9.48	7,492.0	22.07	583.0	16.8	1,463.0	23.0	1,125.0	18.00	3.25
ASIA (less USSR)	2,055.8	56.56	6,803.0	20.04	1,073.0	30.9	1,077.0	17.0	1,350.0	21.60	0.67
OCEANIA	19.37	0.53	2,103.0	6.19	69.0	2.4	1,104.0	17.4	300.0	4.80	15.8
WORLD TOTALS	3,632.1	100.00	33,935.3 [2]	100.0	3,741.0 [4]	100.0	6,352.0	100.0	6,250.0	100.0	(1.7)
DEVELOPED REGIONS	1,028.0	23.65	13,643.0	41.5	1,563.0	45.0	2,899.0	45.6	2,925.0	47.0	(2.8)
LESS DEVELOPED REGIONS	2,604.6	73.65	19,251.0	58.5	1,908.0	55.0	3,453.0	54.4	3,325.0	53.0	(1.28)
FREE WORLD	2,452.9	69.35	24,105.1	74.9	2,451.5	70.6	4,946.0	77.9	4,150.0	66.4	(1.7)
COMMUNIST BLOC	1,179.0	30.65	8,788.9	25.1	1,019.5	29.4	1,406.0	22.1	2,100.0	33.6	(1.8)

FOOTNOTES:-

[1] North America includes only Canada, United States and Possessions. Mexico is included with the Latin American countries.

[2] The total world figure is probably in error due to compounding of some figures...data sources are not always clear as to countries or portions included or excluded.

[3] Sources include UNFAO reports on world conditions, 1974 World Almanac, ERA bulletins of food production sources and acreages and others.

[4] General Estimates indicate that only about 2.5 billion acres are harvested annually.

North America has less than 12 percent of the world's cropland, yet the United States and Canada ship nearly 80 percent of all agricultural exports and have done so for a decade or more. Our potential resources in relation to population are comparable to South America, Africa and the Communist Bloc (excluding China). Western Europe has little more cropland per capita than Asia but provides a much higher standard of living for its people. Much higher productivity per capita, enabling imports provides Western Europe with the second highest standard of living in the world.

The world is using, at various levels of efficiency, nearly 3.75 billion acres of land. Land potentially available for agricultural use is estimated to be 6.25 billion acres. The present use of pesticides in food production throughout most of the world is far below that used in the United States. With limited supplies of viable land and continuing population growth, pressures on the food supply will continue to demand increasing intensification in agricultural production. Thus, the outlook for pesticide usage is for continuing increased demand, necessitating careful evaluation of systems of control and long range regional and world-wide planning of integrated pest control programs.

PART II

ECONOMIC IMPACTS SOLELY ATTRIBUTABLE TO THE INCREMENTAL REQUIREMENTS OF 1972 FIFRA AS AMENDED

As indicated in the introduction to this report, 1972 FIFRA as amended is but the latest in a series of acts, orders and regulations concerned with the control of the pesticides industry in the United States. As a result, a substantial part of the total body of regulations governing the pesticide industry was already in place prior to enactment of the 1972 FIFRA as amended.

This part of the report has as its objective the evaluation of those economic impacts due solely to the incremental requirements resulting from 1972 FIFRA as amended. Further, the evaluation is limited to those sections of the Act which may have economic impacts on the industry, pesticide users and consumers.

1972 FIFRA as amended includes 27 sections as follows:

Section	Rules & Regulations Reference	Description
1.		Short title and table of contents
2.		Definitions
*3.	FR. July 3, 1975	Registration of pesticides
*4.	FR. Oct. 9, 1974 and Mar. 12, 1975	Use of restricted pesticides, certified applicators
*5.	FR. Apr. 30, 1975	Experimental use permits
6.		Administrative review, suspension
*7.	FR. Nov. 6, 1973	Registration of establishments
*8.	FR. Sept. 18, 1974	Books and records
*9.		Inspection of establishments, etc.
10.		Protection of trade secrets, etc.
11.		Standards applicable to pesticide applicators
*12.	FR. May 5, 1975	Unlawful acts
13.		Stop sale, use, removal and seizure
14.		Penalties

Section (con'd)		Description (con'd)
15.		Indemnities
16.		Administrative procedure, judicial review
17.		Imports and exports
18.		Exemption of Federal agencies
*19.	FR. May 1, 1974	Disposal and transportation
20.		Research and monitoring
21.		Solicitation of public comments; notice of public hearings
22.		Delegation and cooperation
23.		State cooperation, aid and training
*24		Authority of States
25.		Authority of Administrator
26.		Severability
27.		Authorization for appropriations

Each of the sections was reviewed and a determination was made of those sections which could result in direct economic impacts. These sections, designated by *, include sections: 3, 4, 5, 7, 8, 9, 12-G (use inconsistent with labeling), 19 and 24-C (State registrations for local needs).

Guidelines and regulations governing these sections were reviewed and analyzed and those requirements which represented additions solely attributable to 1972 FIFRA as amended were identified.

On the basis of these incremental requirements, estimates were made of the added costs which may result to the pesticide industry, pesticide users, consumers and society in general.

Data and information necessary for this analysis were developed from a number of sources. Principal sources included:

- The Environmental Protection Agency
- Contacts with pesticide manufacturers and formulators and industry trade associations
- Private pesticide testing laboratories
- State Agricultural Experiment Stations and Cooperative Agricultural Extension Services
- U.S. Department of Agriculture
- Published and unpublished research reports and data series from Federal and State agencies and private research firms.

I. Incremental Costs of Pesticide Registration and Reregistration Solely Attributable to Section 3, 1972 FIFRA as Amended

Most of the efforts and costs required to register and reregister pesticides under 1972 FIFRA as amended are not the direct result of increased testing and registration requirements specifically imposed by the Act, but stem from testing and registration requirements currently in force.

At the time that all products are reregistered under 1972 FIFRA as amended, some registrants will find it necessary to update their product files to meet existing registration or reregistration requirements and may, in addition, be required to provide information on those additional, or incremental tests specifically required by 1972 FIFRA as amended.

This section considers only those incremental testing requirements and costs which are specifically required by 1972 FIFRA as amended. The costs specified are only those associated with performing those additional tests required by 1972 FIFRA as amended and do not include any costs which will be incurred in updating product files to meet current registration or reregistration requirements.

A. Incremental Tests Required for Registration or Reregistration Under 1972 FIFRA as Amended

The requirements for registration of new pesticides or for reregistration of existing pesticides which are solely attributable to 1972 FIFRA as amended are stated by EPA in the Guidelines and Regulations for Section 3 and are specified by EPA as follows:

1. Registration of new active ingredients (AI)

   The additional tests required are as follows:

   a. Teratological studies
   b. Oncogenicity studies
   c. Chronic feeding studies
   d. Reproduction studies
   e. Mutagenesis studies
   f. Chronic fish residue studies

2. Reregistration of existing active ingredients

   The additional tests required are as follows:

   a. Teratological studies
   b. Oncogenicity studies
   c. Chronic feeding studies
   d. Reproduction studies

However, it is proposed that in the future, reregistrations will require the same tests as specified for new registrations. The following quote from the Federal Register, Vol. 40, No. 129, Thursday, July 3, 1975, page 28250 states EPA's position in this regard."

> "EPA realizes that full compliance with the data requirements imposed on new registrations would be desirable for reregistration as well. By October, 1976, however, EPA must reregister in excess of 30,000 pesticide products. It would be administratively impossible to require all of these products to satisfy the data requirements for new registration. Five year renewals of registration, however, will be processed on a staggered basis; it is at this junction that the then current data requirements for new registration will apply to all products previously registered by the Agency."

Thus, it would appear that within five years, reregistration of certain products for which use patterns or exposures may pose the possibility of mutagenic or chronic fish residue hazards may require the six tests listed in (A-1) above.

3. Registration of new pesticide formulations

No additional testing requirements for the registration of new pesticide formulations are imposed by 1972 FIFRA as amended. Provided that registration requirements have been met by all active ingredients used in the formulation of these products, EPA generally will base registration of pesticide formulations on test data for those AI which are incorporated in the pesticide formulations for which registration is sought. (Federal Register Vol. 40, No. 129, Thursday, July 3, 1975, page 28248). If the AI have been cleared and registered by EPA, then no additional test data will be required for registration of those products which use these AI in their formulation.

4. Reregistration of existing pesticide formulations

No additional testing requirements for the reregistration of existing pesticide formulations are imposed by 1972 FIFRA as amended provided that registration requirements have been met by all active ingredients used in the formulation of these products. EPA generally will base reregistration of pesticide formulations on test data for those AI which are incorporated in the pesticide formulations for which registration is sought. (Federal Register Vol. 40, No. 129, Thursday, July 3, 1975, page 28248). If the AI's have been cleared and registered by EPA, then no additional test data will be required for reregistration of those products which use these AI in their formulation.

A listing was developed, by EPA Office of Pesticide Programs, of the tests which would be required for reregistration of all active ingredients. Two general categories of testing were specified:

a. Incremental required tests only
b. "Other" data required to update registration.

A sample of 660 AI, out of the total of approximately 1,400 including salts and esters, was reviewed to determine the tests which would be required. Included in this sample were all AI (248) for which FDA tolerances on agricultural pesticides had been established. Also included in the sample were all other major or significant AI. Consequently, extrapolation from this sample to the total of 1,400 AI would result in a maximum of testing requirements and would tend to overstate the economic impacts of registration and reregistration, since it is probable that the remaining pesticides would not require as extensive test data as those in the sample.

The test requirements for reregistration, as indicated by this sample, are shown in Table 16. This table indicates those tests which are purely incremental as the result of requirements of 1972 FIFRA as amended.

The final line in Table 16, designated as "total expanded" represents an estimate of the total cost of providing the incremental tests required for reregistration of all AI. This cost is an approximation and was based on the following rationale:

a. 660 represents approximately 47.1 percent of the total of 1,400 AI currently registered with EPA.

b. Included in the 660 AI in the sample are all agricultural pesticide AI for which FDA tolerances have been established, plus all other "major" pesticide AI. Since testing requirements for "non-tolerance" pesticides, i.e. those which do not require FDA tolerances, are less restrictive, it would be expected that a smaller proportion of the remaining AI, not included in the sample, would require the full range of testing.

c. Although approximately 1,400 AI are registered with EPA, not all are actively produced and this group would probably not be reregistered. In addition, another group (estimated by EPA at 350) are not AI in the technical sense that they do not perform alone.

On the basis of this reasoning, it is believed that linear expansion of the number of product tests as shown in the sample (Table 16) provides a maximum estimate of the incremental tests and testing costs required by 1972 FIFRA as amended required for reregistration of active ingredients. However, the expanded cost will be used in estimating reregistration costs for the industry.

Table 16. Incremental costs associated with the reregistration of active ingredients under 1972 FIFRA as amended[1]
(Incremental required tests only - does not include materials or administrative costs)

Pesticide category	AI reg. in cat.	AI in sample	Test data required																Total projected test costs (000)
			Teratogenic				Reproduction				Oncogenic[2]				Feeding[2]				
			No. A.I. Sample	No. A.I. Proj[3]	$/test	Total proj.$ (000)	No. A.I. Sample	No. A.I. Proj[3]	$/test	Total proj.$ (000)	No. A.I. Sample	No. A.I. Proj[3]	$/test	Total proj.$ (000)	No. A.I. Sample	No. A.I. proj[3]	$/test	Total proj.$ (000)	
Insecticides	221	165	67	89	$7,000	$ 623	29	39	$23,500	$ 916	52	69	$34,000	$2,346	26	35	$66,000	$2,310	$ 6,195
Herbicides	407	232	57	100	7,000	700	42	74	23,500	1,739	32	56	34,000	1,904	39	68	66,000	4,488	8,831
Rodenticides	84	16	1	5	7,000	35	0	0	-		0	0			1	5	66,000	330	365
Fungicides	270	72	19	71	7,000	497	8	30	23,500	705	21	79	34,000	2,686	3	11	66,000	726	4,614
Disinfectants	427	175	113	276	7,000	1,932	2	5	23,500	118	32	78	34,000	2,652	24	59	66,000	3,894	8,596
Total	1,409	660	257	541	7,000	3,787	81	148	23,500	3,478	137	282	34,000	9,588	93	178	66,000	11,748	28,601

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[1] Tests required and number of active ingredients for which incremental testing will be required, provided by Office of Pesticide Program, EPA. Data were developed from review of registration requirements of 660 active ingredients out of a total of approximately 1,400 registered with EPA. Included in the 660 were all pesticides with FDA tolerances and all other pesticides where "significant" human or environmental hazards were identified.

[2] These tests are normally performed together, cost of the combined tests per AI is estimated at $100,000.

[3] Projection = $\frac{\text{No. A.I. Total}}{\text{No. A.I. Sample}}$ x No. A.I. in sample needing test.

It must be emphasized that this statment of incremental tests is limited to only those additional tests which are specifically required by 1972 FIFRA as amended. All other tests needed to classify a pesticide according to Sec. 3 and in existence prior to date of enforcement must be met in full in order to register or reregister pesticides.

B. Limitation of incremental testing required by 1972 FIFRA as Amended

Not all pesticides will require all of the incremental tests required by 1972 FIFRA as amended. The tests specified, teratological, oncogenicity, chronic feeding, reproduction, mutagenesis and chronic fish residues are generally applicable primarily to those products where use patterns indicate the possibility of direct or indirect (e.g. through livestock feeding) hazards to humans or where chronic fish residues may be expected. In general, those products which will require these tests are those for which FDA tolerances have been established. A computer listing, made in July, 1975 by the Office of Pesticide Programs, EPA, of those active ingredients used in agricultural pesticides, for which FDA tolerances have been established, resulted in a listing of 248 active ingredients. It is believed by EPA that this accounts for nearly all of the AI for which FDA tolerances exist and that the total number of AI for which the specified incremental tests would be required would not exceed 300--out of a total of approximately 1,400 registered with EPA.

In addition, under certain circumstances and upon petition by an applicant, waivers of data requirements may be granted for registration or reregistration by the Administrator. Conditions for waivers are stated in the Federal Register, Vol. 40, No. 129, Thursday, July 3, 1975, page 28248, as follows:

> "Waiver of a data requirement is permissible only if the Administrator determines (1) that the composition, degradability, proposed patterns of use or other chemical or physical properties of the pesticide, relating to an evaluation of the effects on man or the environment, are fundamentally different from the properties considered by the Agency in establishing the data requirements of these regulations or the Registration Guidelines, and therefore (2) that the data are not necessary in order for him to determine whether such specific pesticide or product will generally cause unreasonable adverse effects on man or the environment. Generally, an applicant must initiate the process and submit a written statement setting forth his reasons for requesting a waiver from a data requirement. In the case of reregistration, however, the Administrator may initiate the waiver of a data requirement by so indicating in his solicitation of applications for reregistration."

C. Estimated Incremental Costs - Registration of New Active Ingredients

As indicated in Section A. 1. 1972 FIFRA specifies six additional tests, not previously required for those AI where use patterns indicate the possibility of direct or indirect hazards to humans or where chronic fish residues may be expected. The costs of performing these tests were obtained from commercial testing laboratories and do not include the costs of pesticides used. Therefore, the reported test costs have been increased by 10 percent to allow for materials used and administrative costs of registration incurred by the applicant. The Registration Division of EPA reports that approximately ten new chemicals (AI) are registered per year. If all six tests were required on each of these AI, the incremental costs, due to 1972 FIFRA as amended, of registering each new AI would be as shown below.

Test	Representative test cost [1]	10% contingency [2]	Total test cost
Teratogenic	$ 7,000	$ 700	$ 7,700
Oncogenic)[3]			
Chronic feeding)	100,000	10,000	110,000
Reproduction	23,500	2,350	25,850
Mutagenic	5,000	500	5,500
Chronic fish residues	10,000	1,000	11,000
Total	$145,500	$14,550	$160,050

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[1] These costs were obtained from private commercial testing laboratories. It is recognized that the test cost will vary with the product and the proposed uses, but the costs shown are reported as "representative" for the tests indicated.

[2] To allow for cost of pesticides used in testing company review of testing programs and for company administrative costs of registration incurred by the company seeking registration.

[3] These tests are normally performed together.

Based on an average cost of $160,050 per new AI, if 10 new AI required the full range of tests, the annual incremental costs of registering new AI, due solely to the incremental requirements of 1972 FIFRA as amended, would be $1,600,500. Given the test costs specified above, this would be the maximum cost since, based on current registrations, not all AI will require all tests.

D. Estimated Incremental Costs - Reregistration of Active Ingredients

At the present time, 1972 FIFRA as amended requires four additional tests, not previously required (see Section A, 2 this report), for reregistration of those AI where use patterns indicate the possibility of direct or indirect hazards to humans or where chronic fish residues may be expected. Table 16 shows the costs of commercial laboratory testing required for reregistration of existing AI. Again, these commercial laboratory test costs do not include the cost of pesticides used in the testing process nor the company administrative costs involved in reregistration. Therefore, these costs have been increased by 10 percent to reflect these items.

Although incremental reregistration requirements for AI beginning October 21, 1976 initially may require only the four tests shown in Part A of Table 16, EPA has indicated (see Section A, 2 of this report) that within the next five years additional tests for mutagenesis and chronic fish residues may be required for reregistration in the same manner as they are required for registration of new AI. Therefore, reregistration costs must be calculated for two periods, 1976-1981 and 1981 and thereafter.

Based on Table 16, the estimated incremental reregistration costs for active ingredients attritutable solely to 1972 FIFRA as amended, would be as follows:

October 1976 - October 1981

Test	Lab Test Cost + 10%	No. AI	Total Cost
Teratogenic	$ 7,700	541	$ 4,165,700
Oncogenic[1]	37,400	282	10,546,800
Chronic feeding[1]	72,600	178	12,922,800
Reproduction	25,850	148	3,825,800
Total	-		$31,146,100

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[1] These tests are normally done together at an estimated lab test cost of $110,000.

Additional testing, after October 1981

Additional Test	Lab Test Cost + 10%	Est. No. AI[1]	Total Cost
Mutagenic	$ 5,500	282	$ 1,551,000
Chronic fish residues	11,000	178	1,958,000
Total	-	-	$ 3,509,000

Discounting this value from 1981 back to 1976 at 10 percent gives a 1976 present value of $2,179,000.

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[1] Estimated by DPRA, mutagenic estimated at approximately same number as oncogenic, chronic fish residues estimated at same number as chronic feeding tests.

E. Estimated Incremental Costs, Registration or Reregistration of New or Existing Formulations

As explained in Section A, 3 and 4 of this report, no additional testing requirements for the registration or reregistration of pesticide formulations are imposed by 1972 FIFRA as amended, provided that registration requirements have been met by all active ingredients used in the formulation of these products. Based on this premise, there would be no additional tests or testing costs, attributable solely to 1972 FIFRA as amended, required for the registration or reregistration of pesticide formulations. The only direct costs would be those administrative costs involved in the reregistration process.

F. Estimated Costs - Required Relabeling

Production Cost

1. Labels must be similar

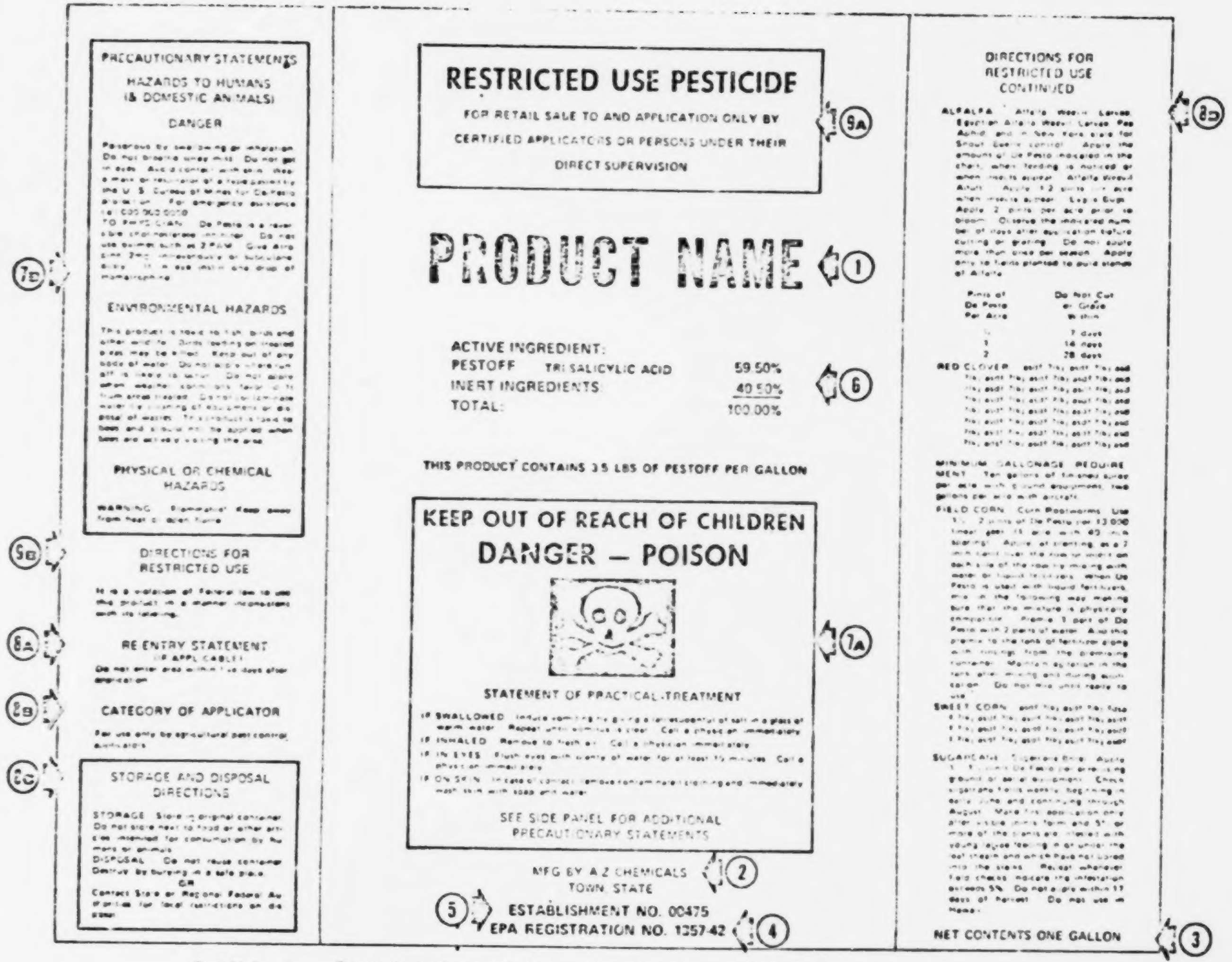
One of the important aspects of 1972 FIFRA as amended is to bring all labels on pesticides, disinfectants, etc. into a common format. The consumer will know where to look for information regardless of the type of product. All precautionary statements, ingredient statements, antidotes, use directions, etc., will be in a precise location. Illustrative label formats are shown in Exhibits 1 and 2.

2. Cost of label changes

The impact on the manufacturer of AI or reformulator includes those expenses in producing new art work, plate production, litho masters, etc., but not the package or printing costs. Certain amounts of office time are also required but were not included in the cost estimate.

A study of 17 reformulators and 4 basic manufacturers indicated that the cost of production of a new label for the reformulator was $406 and $377 for the basic AI manufacturer. Since some products have more than one label (e.g., for different size containers), the reformulator study showed a cost of $524/product. Data were not available to calculate the per product cost for the Basic AI producer. Costs varied considerably, from $100 for a paste-on label to over $1,000 for litho masters for aerosols, 5 gallon cans or 55 gallon drums.

A label cost estimate of $500/product was used as representative for the 35,500 products. It is recognized that each year approximately 5,500 labels are amended, requiring a change in the label. This change is normally only a small change in the wording, requiring at most one new (black) plate at a nominal cost. To reflect this change, credit has been allowed for one fifth of the label cost, or $100 on 5,500 labels. Thus total label cost would equal 35,500 labels at $500 or $17,750,000 minus credit for amended labels (5,500 x 100) $550,000 for a total label cost to industry of $17,200,000.


7B
9B
8A
8B
8C
9A
1
6
7A
2
5
4
3
8D

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS
(& DOMESTIC ANIMALS)

DANGER

ENVIRONMENTAL HAZARDS

PHYSICAL OR CHEMICAL
HAZARDS

DIRECTIONS FOR
RESTRICTED USE

RE-ENTRY STATEMENT
(IF APPLICABLE)

CATEGORY OF APPLICATOR

STORAGE AND DISPOSAL
DIRECTIONS

RESTRICTED USE PESTICIDE

FOR RETAIL SALE TO AND APPLICATION ONLY BY
CERTIFIED APPLICATORS OR PERSONS UNDER THEIR
DIRECT SUPERVISION

PRODUCT NAME

ACTIVE INGREDIENT:		
PESTOFF	TRI SALICYLIC ACID	59.50%
INERT INGREDIENTS:		40.50%
TOTAL:		100.00%

THIS PRODUCT CONTAINS 3.5 LBS OF PESTOFF PER GALLON

KEEP OUT OF REACH OF CHILDREN

DANGER — POISON

STATEMENT OF PRACTICAL TREATMENT

SEE SIDE PANEL FOR ADDITIONAL
PRECAUTIONARY STATEMENTS

MFG BY A-Z CHEMICALS
TOWN, STATE

ESTABLISHMENT NO. 00475
EPA REGISTRATION NO. 1257-42

DIRECTIONS FOR
RESTRICTED USE
CONTINUED

ALFALFA

Pints of De Pesto Per Acre	Do Not Cut or Graze Within
½	7 days
1	14 days
2	28 days

RED CLOVER

MINIMUM GALLONAGE REQUIREMENT

FIELD CORN

SWEET CORN

SUGARCANE

NET CONTENTS ONE GALLON

Exhibit 1. Restricted pesticide, illustrative label format.

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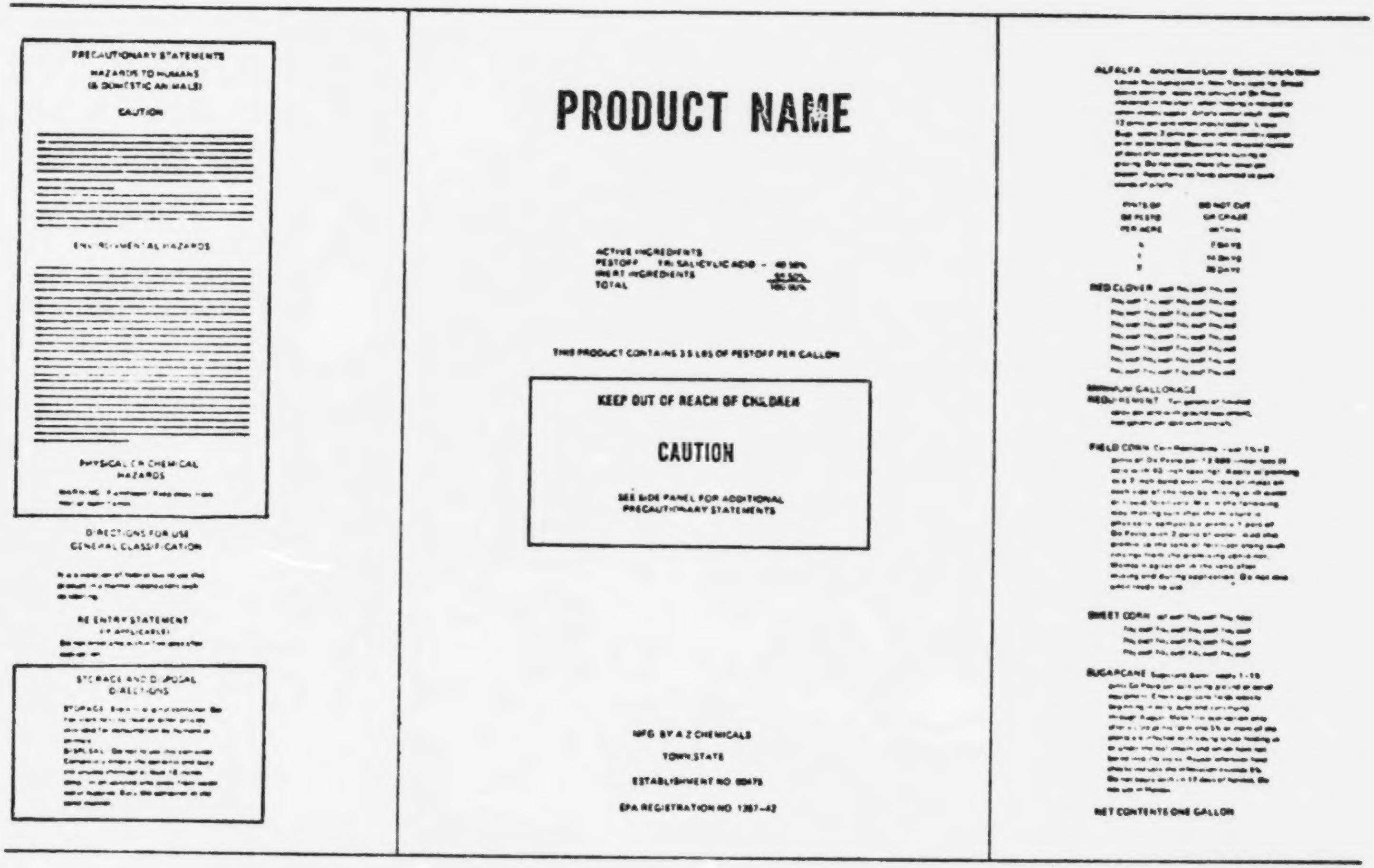
best available copy.



PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS
(& DOMESTIC ANIMALS)

CAUTION

ENVIRONMENTAL HAZARDS

PHYSICAL OR CHEMICAL
HAZARDS

DIRECTIONS FOR USE
GENERAL CLASSIFICATION

RE ENTRY STATEMENT
(IF APPLICABLE)

STORAGE AND DISPOSAL
DIRECTIONS

STORAGE

DISPOSAL

PRODUCT NAME

ACTIVE INGREDIENTS
PESTOFF TRI SALICYLIC ACID - [illegible]
INERT INGREDIENTS [illegible]
TOTAL [illegible]

THIS PRODUCT CONTAINS 3.5 LBS OF PESTOFF PER GALLON

KEEP OUT OF REACH OF CHILDREN

CAUTION

SEE SIDE PANEL FOR ADDITIONAL
PRECAUTIONARY STATEMENTS

MFG BY A Z CHEMICALS

TOWN, STATE

ESTABLISHMENT NO [illegible]

EPA REGISTRATION NO 1387-42

ALFALFA

RED CLOVER

MINIMUM GALLONAGE
REQUIREMENT

FIELD CORN

SWEET CORN

SUGARCANE

NET CONTENTS ONE GALLON

Exhibit 2. General pesticide, illustrative label format.

Reproduced from
best available copy.

3. Losses due to over-supply of labels on October 21, 1976

Losses on labels will result from inventories of labeled containers in the hands of formulators and manufacturers at the time that change-over to the new labels is required. Containers such as printed bags (5, 25 or 50 pounds), shipping cartons, lithographed cans, etc., are normally ordered in large quantities several months in advance of delivery. Manufacturers and formulators cannot estimate their sales exactly and must maintain adequate container inventories. A $600 inventory loss per product would represent only 600 to 1,200 containers and this would be a minimal inventory of containers, especially considering that one product may have several different sizes and types of containers.

Since it is reported that 5,500 labels are amended each year, based on 35,500 total number of registered products, label inventory losses would be incurred on 30,000 products. On this basis losses on inventories of labeled containers would be 30,000 products at $600 each or $18,000,000.

G. Summary, Incremental Costs of Registration and Reregistration of Pesticides Solely Attributable to Requirements of 1972 FIFRA as Amended

Based only on the incremental testing requirements of 1972 FIFRA as amended, which apply only to active ingredients, the incremental costs of 1972 FIFRA as amended would be as follows:

1. "One time" costs

Item	Cost
a. Reregistration	
(a) 1976-1981	$31,146,000
(b) additional cost 2 tests, beginning 1981	2,179,000[1/]
(c) Total reregistration costs	$33,325,000
b. Label costs	
(a) Production of new labels	17,200,000
(b) Loss on labels discarded after October 21, 1976	18,000,000
(c) Total label costs	35,200,000
c. Total "one-time" costs	$68,525,000

2. "Continuing" annual incremental costs

a. Registration of "new" AI	$ 1,600,500

[1/] Discounted cost.

H. Section 3c1D Impacts

Section 3c1D states "if requested by the Administrator, a full description of the tests made and the results thereof upon which the claims are based, except that data submitted in support of an application shall not, without permission of the applicant, be considered by the Administrator in support of any other application for registration unless such other applicant shall have first offered to pay reasonable compensation for producing the test data to be relied upon and such data is not protected from disclosure by section 10(b). If the parties cannot agree on the amount and method of payment, the Administrator's determination shall be made on the record after notice and opportunity for hearing. If the owner of the test data does not agree with said determination, he may, within thirty days, make an appeal to the Federal District Court for the district in which he resides with respect to either the amount of the payment or the terms of payment, or both. In no event shall the amount of payment determined by the court be less than that determined by the Administrator." [1]

The impact of Section 3c1D must be considered from two viewpoints:

* The incremental dollar cost which would result to the industry as a whole.

* The possible impacts on industry organization, structure and competition.

1. Dollar impact, industry aggregate - No industry aggregate dollar impact is projected. Although users of AI data may have to make "reasonable compensation" to owners of such AI data, such payments would represent intra-industry transfer payments and the overall cost to the total pesticide industry should remain essentially unchanged.

2. Impacts on industry organization, structure and competition - It is possible that formulators, particularly small pesticide formulators, would be adversely impacted as a result of 3c1D. The degree to which such firms are impacted would depend primarily on three situations:

    a. The degree to which owners of AI, primarily manufacturers, would grant to formulators permission to use AI test data free of charge.
    b. If charges are made, the "reasonableness" of such charges and the degree to which formulators may have to appeal "unreasonable" charges through the Administrator, EPA or through the courts.
    c. The degree to which owners of AI may resist access to AI test data.

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[1] Public Law 92-516, Federal Insecticide, Fungicide and Rodenticide Act of 1972, as amended, Section 3c1D.

If charges for use of AI data are high or if formulator access to AI data are denied by owners of such data, then Section 3c1D would tend to prevent registration for affected products by those who do not own AI data for such products.

This could result in forcing such formulators to drop such products, could force certain formulators out of business and could result in a reduction of competition in the industry. The number of products and firms impacted cannot be determined until these situations actually occur.

II. Economic Impact of Section 4 - Use of Restricted Use Pesticides by Certified Applicators

A. General

This section deals with the certification of applicators of restricted use pesticides and the necessary training, retraining, certification and overhead necessary to operate the plan as mandated in Section 4 of 1972 FIFRA as amended. The certification or approval of the State Plan to do the above duties such as administrate, train, certify and enforce is mandated in the Act. The State Plan approved must conform to and be at least equal to or can exceed the Federal Standards. The basic thrust of FIFRA as amended as passed by Congress is the classification of pesticides into restricted and general classification according to their hazard and use and the use of restricted pesticides only by certified commercial or private applicators.

B. Categorization of Commercial Applicators of Pesticides

1. Categories of Applicators (171.3)

Applicators (other than private) using or supervising the use of restricted use pesticides are categorized for certification purposes as follows:

a. Agricultural Pest Control
    1. Plant
    2. Animal
b. Forest Pest Control
c. Ornamental and Turf Pest Control
d. Seed Treatment
e. Aquatic Pest Control
f. Rights-of-way Pest Control
g. Industrial, Institutional, Structural and Health-related Pest Control
h. Public Health Pest Control
i. Regulatory Pest Control
j. Demonstration and Research Pest Control

State systems of categories should adapt these category identifications as needed along with justifiable other categories and subcategories.

C. Standards for Certification of Commercial Applicators

Competence in the use and handling of pesticides is determined through an examination or other appropriate means approved by the Administrator.

The areas of competency shall be in

1. Label and labeling comprehension
2. Safety
3. Environment
4. Pests
5. Pesticides
6. Equipment
7. Application techniques
8. Laws and regulations

D. Standards for Certification of Private Applicators

The private applicator must possess a practical knowledge of the pest problems and pest control practices associated with his agricultural operation; proper storage, use, handling and disposal, and his related legal responsibility. His practical knowledge shall be in these areas and by some means certified to be acceptable by the State and Federal laws.

He must demonstrate competence in the following areas:

1. Recognization of common pests
2. Understanding of the label and label information
3. Application procedures according to label instructions and warnings
4. Recognization of local environmental situations
5. Recognization of poisoning symptoms and procedures to follow in case of accident.

E. Standards for Supervision of Non-Certified Applicators by Certified Private and Commercial Applicators

The supervising certified applicator must understand the requirements of the supervisory role and must demonstrate a practical knowledge of Federal and State supervisory requirements.

F. Types of Costs - Section 4

1. Applicators

The applicator will have to travel to the location for training. Contacts were made by letter with all states regarding applicator certification programs and replies were received from 37. Most states propose to offer training through the Cooperative Extension Service on a county or regional basis. To reflect this localized training program, 25 miles travel each way (50 miles round trip) were estimated for each applicator.

2. Cost of Education and Training and Certification
The education and training of applicators will, in nearly all instances, be assigned to the State Cooperative Extension Service. It will be necessary for them to create a program for training all applicators. The cost for training commercial applicators will be much greater than for private applicators.

In most instances the State Department of Agriculture, or a related department, will have the duty to examine, grade and certify the commercial applicators. Costs reported by the States were the basis for estimating these incremental costs.[1]

3. Increased Record Costs to Commercial Applicators
Commercial custom applicators will be required to keep more records and keep them for ready access to inspection for two or more years. The increased cost over that which they are keeping now is estimated to be $100 for each of 100,000 commercial custom applicators. This includes the large aerial and pest control companies affected.

4. Cost of Monitoring and Enforcement
Contacts made with the States, revealed that they expect an average annual expenditure of $210,000 per state to monitor and enforce applicator certification requirements of 1972 FIFRA as amended. This will include the travel of State personnel in their monitoring activity and collection and analysis of data or samples for enforcement if infringements of the Act are noted.

5. Cost of Continuing Education
It is estimated that there will be 10 percent more new applications (private and commercial) to educate, train and eventually certify each year. In addition, the present certified private and commercial applicators will need upgrading education, maintenance instruction and refresher courses. Contacts with the States indicated that these costs would average $50,000 per per state per year based on present ideas on the way in which such programs would be maintained.

G. Economic Impact - Section 4

Details of the estimate of the cost directly attributable to Section 4 are given in Table 17. No allowance has been made for time lost by private or commercial applicators, nor for subsistence involved in their participation in training programs or testing and certification requirements. As a result, the estimate is for cash costs only--costs which are directly attributable to training, testing and certification. In summary, these costs are as follows:

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[1] H.R. 8841, November 19, 1975 provides that private applicators may be certified without examination on submission of affirmation that they have completed an approved training program.

Table 17. Economic Impact - Section 4

Cash costs associated with the implementation of Section 4 were estimated as follows:

Type of Cost	Basis	Cost
A. Initial Costs of Implementing Program		
1. Costs to applicators		
a. Private applicators		
Transportation to training	50 miles @ 12¢ = $6.00 x 1.5 million applicators	$ 9,000,000
Cost of educational materials	$0.50 per applicator x 1.5 million applicators	750,000
Cost of certification	$2.00 per applicator x 1.5 million applicators	3,000,000
Total cash cost, private applicators		$12,750,000
b. Commercial applicators		
Transportation to training	50 miles @ 12¢ = $6.00 x 192,000 applicators	$ 1,152,000
Transportation to exam	50 miles @ 12¢ = $6.00 x 192,000 applicators	1,152,000
Cost of educational materials	$3.00 per applicator x 192,000 applicators	576,000
Cost of certification	$40.00 per applicator x 192,000	7,680,000
Total cash cost, commercial applicators		$10,560,000
c. Total cost to applicators		$23,310,000
2. Cost to States for education and training programs and applicator certification		
a. Private applicator program		
State cost of education and training	$9.00 per applicator x 1.5 million applicators	$13,500,000
State cost of certification	$5.00 per applicator x 1.5 million applicators	7,500,000
Less cost of educational materials charged to applicators (1a)		- 750,000
Less certification fees charged to applicators (1a)		-3,000,000
Net cost to States		$17,250,000
b. Commercial applicator program		
State cost of education and training	$33.00 per applicator x 192,000 applicators	$ 6,336,000
State cost of certification	$34.00 per applicator x 192,000 applicators	6,528,000
Less cost of educational materials charged to applicators (1b)		- 576,000
Less certification fees charged to applicators (1b)		-7,680,000
Net cost to States		$ 4,608,000
c. Total net cost to States		$21,858,000
3. Total initial cost of implementing the applicator certification program		
a. To applicators (1a + 1b)		$23,310,000
b. To States (2a + 2b)		21,858,000
c. Total initial cost		$45,168,000
B. Reoccurring Costs - Annual Basis		
1. Increased cost of commerical, custom applicators, record keeping and retention		
	Cost of keeping and retaining records $100 per applicator x 100,000 custom applicators	$10,000,000
2. Cost to States for monitoring and enforcement		
	50 States x $210,000 per state	$10,500,000
3. Maintaining, updating and revising applicator training information and training programs		
	50 states x $50,000 per state	$ 2,500,000
4. Continued training of applicators, based on attendance at workshops, etc. every other year		
	Applicators' costs, 1/2 of training costs indicated under (1) if programs for updating operator competence are carried out and applicators attend training sessions every second year	5,739,000
5. Total reoccurring costs		$28,739,000

1. Initial costs of implementing program	
a. Cost to applicators	
(1) Private	$12,750,000
(2) Commercial	10,560,000
(3) Total	23,310,000
b. Cost to States for training and certification	21,858,000
c. Total initial cost	$45,168,000
2. Reoccurring annual costs	
a. Record keeping, custom applicators	$10,000,000
b. State monitoring and enforcement	10,500,000
c. Updating and revising training programs	2,500,000
d. Continued training of applicators	5,739,000
e. Total reoccurring costs	$28,739,000

III. Economic Impact - Section 5, Experimental Use Permit

A. Requirements

Section 5 of the 1972 Federal Insecticide, Fungicide, and Rodenticide Act as amended states in general that any person wishing to accumulate information necessary to register a pesticide under Section 3 of the act may apply to the administrator at any time for an experimental use permit to:

(1) register a pesticide not previously registered with the agency,

(2) register another use not previously approved for a registered pesticide.

A substance or mixture of substances being tested under limited circumstances to determine if there is pesticidal value need not have an Experimental permit until there is determined that a "pesticidal value exists" for a particular use.

1. Information required on applications

The following items of information are required on applications for experimental permits

a. General requirements
   (1) Name and address of applicant
   (2) Registration number of product if registered
   (3) Purpose or objectives of the proposed testing
   (4) Name, street address, telephone number and qualifications of all participants in the program.
   (5) Name and street address of all cooperators if available at the time an application is submitted or soon thereafter.
   (6) All previous tests conducted to determine toxicity and effects in or on target organisms at the site of application, phytotoxicity and other forms of toxicity or effects on non-target plants, animals, and insects at or near the site of application and adverse effect on the environment.
   (7) Proposed method of storage and disposal of unused experimental use pesticide and containers.
   (8) Such other pertinent data requested by administrator.

b. Requirements for tolerance
   If used in a manner that a residue can reasonably be expected in or on food or feed, the applicant must:

(1) Submit evidence that a tolerance or exemption from a requirement has been established for residues in or on such food or feed or
(2) Submit petition proposing establishment of tolerance or exemption for tolerance or
(3) Certify that produce from the experimental program will be destroyed or fed only to experimental animals.

c. Additional requirements for unregistered pesticide products
  (1) Complete confidential statement of composition
  (2) Complete chemical and physical properties of each active ingredient for determining the active ingredients
  (3) Appropriate data on decomposition of residues on treated crop or environmental site or other information for determining entry of persons into treated area
  (4) Toxicity tests relevant to potential for causing injury to users or exposure to people.

B. Comparison - Requirements 1972 FIFRA as Amended with 1964 FIFRA

The 1964 FIFRA provided for temporary permits for shipment of limited quantities of a product for further testing, usually on a larger scale, to determine its limitations. Information required to get the experimental permit included: (1) certification that the food or feed will not be offered for consumption, except by experimental animals if illegal residues exist, (2) name and address of shipper and points of origin, (3) proposed date or dates of shipment, (4) composition of the material, (5) quantity to be shipped, (6) available data or reference to data on toxicity, (7) nature of the experimental program, (8) percentage of material to be supplied without charge to the user, (9) statement "for experimental use only" and (10) proposed labeling. The requirements of 1964 FIFRA were such that experimental permits could be easily and readily obtained and potential pesticides could be tested broadly on an experimental basis. In addition, many testing programs were under the direction of State and Federal agricultural experimental stations or State agricultural extension services and no permits were required for such testing programs. As a result, many products were labeled without the need for experimental permits.

1972 FIFRA as amended requires, in general, the same types of information as was required in 1964. However, certain provisions of the 1972 Act differ from 1964.

1. No specific exemption is granted to "Federal or State agencies authorized by law to conduct research in the field of economic poisons." This would mean that under 1972 FIFRA as amended, all State Agricultural Experiment Stations, State Agricultural Extension Services and USDA Agricultural Experiment Stations would now be required to get experimental permits. In the past, many pesticide firms conducted pesticide field tests through or "in cooperation with" experiment stations and extension services, without experimental permits, and under 1972 FIFRA experimental permits would be required.

2. Requirements are added for information on disposal of pesticides and containers.

3. Increased requirements for data on chemical and physical properties, toxicity and phytotoxicity, qualifications of participants, residue decline data and environmental data. In general, the amount of detail required in the application has been increased.

4. Pesticides under experimental use permit may not be sold or distributed other than through participants and may be used only at the application site of a cooperator.

5. State agencies may issue experimental permits for testing within the State, but all provisions of Section 5 will apply equally to State plans.

C. Economic Impact

The number of experimental permits issued is expected to increase as provisions of 1972 FIFRA as amended are enforced. EPA reports that prior to 1975 approximately 100 experimental permits were issued annually. They expect the number to increase to 150 in 1975 and 400 or more by 1976. This increase will result from two factors:

1. More complete enforcement of the experimental permit requirements.
2. The requirement that Federal and State agencies now obtain experimental permits.

The incremental impact of 1972 FIFRA, would be associated with item 2, permits required by Federal and State agencies, and by the increased data and detail required as described in Part B of this report.

The economic impacts on industry associated with the experimental permit system arise from two sources:

1. More complete enforcement and monitoring of rules and regulations regarding experimental permits as opposed to enforcement under 1964 FIFRA. The fact that such activities will be stepped up will result in increased costs to industry. However, the increased cost is a result of enforcement of provisions required by 1964 FIFRA as well as by the 1972 Act and thus is not a true incremental cost attributable only to the new requirements of 1972 FIFRA.
2. The incremental requirements of Section 5, 1972 FIFRA as amended.

The determination of the quantitative incremental impact of Section 5 can only be approximated, but it is evident that large plot testing of a pesticidal material previously done by Federal or State agencies in cooperation with industry without a permit, will now require a permit.[1] EPA reports that prior to 1974 only about 100 experimental permits were issued each year but by 1976 they expect that 400 or more permits will be issued. It is assumed that approximately half of these additional permits will result from tests previously conducted by Federal and State agenices without the requirement of a permit. In effect, this arrangement permitted industry to conduct field tests on products without extensive toxicological and ecological testing required by experimental permits. If, as a result of these tests, a candidate product appeared to have commercial value to the point that as a decision is made to proceed with registration, then the necessary toxicological and ecological tests could be completed, an experimental permit applied for, and the data obtained under the experimental permit would be used in registration. Under the 1972 FIFRA experimental permit program, firms are required to develop data necessary to get an experimental permit earlier in the registration process.

It is known that a relatively high proportion of pesticidal products field tested are dropped and are never registered. If it is assumed that out of 400 experimental permits issued, 250 products are dropped prior to reaching registration, then the cost of obtaining these 250 experimental permits represents an incremental cost of Section 5 to the industry. This assumption is based on the following reasoning. If, in the past, these products could be screened by State and Federal agencies without experimental permits, then only the top candidates would be tested under experimental permit. It is also recognized that in order to accomplish such screening, certain tests required for an experimental permit (composition, chemical and physical properties, human toxicity, etc.) would have already been done. However, many of the tests required for toxicity on target organisms, non-target plants, animals, insects and adverse environmental effects and residual effects would not have been done at that time.

For those products for which registration is completed (estimated 150 out of 400), experimental permit testing requirements would provide input for Section 3, registration, requirements. For those 250 products dropped, the cost of these tests would be lost.

Industry estimates place the cost of testing required for issuance of an experimental permit at $100,000 to $300,000. This includes the general chemical and environmental tests required, toxicology, tolerance requirements, residue tests, disposal plans, details on proposed testing program, sites, quantities and other information required for the experimental permit. A part of this information would have been required prior to 1972 FIFRA for testing done without experimental permits. For purposes of this analysis, it is assumed that this would be equal to approximately half the present estimated costs of getting an experimental permit.

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[1] H.R. 8841, November 19, 1975 provides that public or private research and educational institutions may be issued experimental permits by the Administrator under such terms and conditions as the administrator may require, provided that such pesticide may be used only for purposes of experimentation.

If it is assumed that the incremental costs required for an experimental permit vs. non-permit field testing is $100,000 per product, and if it is assumed that 250 candidate products, out of 400 tested under experimental permits, are dropped prior to registration, then the incremental cost resulting from Section 5, due primarily to the fact that all field tests must now be done under experimental permits, would be $25,000,000.

D. Impacts of Delays in Granting Experimental Permits

A matter of concern to industry is the time required from the submission of an application for an experimental permit until the permit is issued by EPA. In the comments received from industry on Section 5, 40FR 18781, it was stated, "The proposed regulations indicated that the Agency would require at least 90 days to process applications for experimental use permits. Several commentators indicated that a 30 or 60 day limit would be more appropriate. The Agency recognizes the importance of processing applications in a timely manner and has established special procedures for the review of applications. Because of the heavy workload in implementing the new law, the Agency cannot guarantee that applications will be acted upon in any specified period of time. In any event, applications will be processed as expeditiously as possible."

Industry's concern stems from their need to get field testing underway in the shortest possible time, once a decision to proceed has been made. If processing of experimental permits is delayed, either because of backlog of applications or because of requests for additional test data to support the application, then the firm may miss a crop season and completion of experimental testing may be delayed 12 months. In a study conducted for EPA 1/ it was reported that current industry experience (1974) indicated an average of 7 months may be required for obtaining an experimental permit.

If unusual delays are encountered in obtaining an experimental permit, and registration of the pesticide is delayed, then the firm may lose the sales volume for as much as a year. Although this does not constitute a cost directly attributable to the requirements of 1972 FIFRA as amended, it does represent an issue of major concern to the pesticide industry.

1/ Evaluation of the Possible Impact of Pesticide Legislation on Research and Development Activities of Pesticide Manufacturers, Arthur D. Little, Inc., Feb., 1975.

IV. Economic Impact - Section 7, Registration of Establishments

A. Section 7, 1972 FIFRA as amended, requires the following

> "(a) Requirement. - No person shall produce any pesticide subject to this Act in any State unless the establishment in which it is produced is registered with the Administrator. The application for registration of any establishment shall include the name and address of the establishment and of the producer who operates such establishment.
>
> "(b) Registration. - Whenever the Administrator receives an application under subsection (a), he shall register the establishment and assign it an establishment number.
>
> "c) Information Required. -
>
> "(1) Any producer operating an establishment registered under this section shall inform the Administrator within 30 days after it is registered of the types and amounts of pesticides -
>
> (A) which he is currently producing;
> (B) which he has produced during the past year; and
> (C) which he has sold or distributed during the past year.
>
> The information required by this paragraph shall be kept current and submitted to the Administrator annually as required under such regulations as the Administrator may prescribe."
>
> "(2) Any such producer shall, upon the request of the Administrator for the purpose of issuing a stop sale order pursuant to section 13, inform him of the name and address of any recipient of any pesticide produced in any registered establishment which he operates." [1]

The proposed regulations for Section 7 were published July 24, 1973 in the Federal Register (38FR 19841) and subsequent to receipt of comments, the final regulations were published in the Federal Register November 6, 1973 (38FR 30558). The regulations include the following sections:

Sec. 167.1	Definitions
Sec. 167.2	Registration procedures
Sec. 167.3	Duration of registration
Sec. 167.4	Labeling requirements
Sec. 167.5	Pesticide reports

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[1] Pub. Law 92-516, Sec. 7, page 15.

Sec. 167.2 provides "All establishments, as defined in this part, which produce any pesticide or device subject to the provisions of this section, must be registered pursuant to the requirements of these regulations: Provided, however, that those persons who produce pesticides solely for application by themselves are not required to be registered."

Information required is as follows:

(1) Name and address of the company
(2) Type of ownership
(3) Names and address of all producing establishments.

The Agency will provide the company with a registration number for each establishment.

Amendments (change of ownership or address) must be submitted by the company within 30 days of such changes.

Sec. 167.3 provides that registration will continue in effect provided pesticides reports are submitted annually.

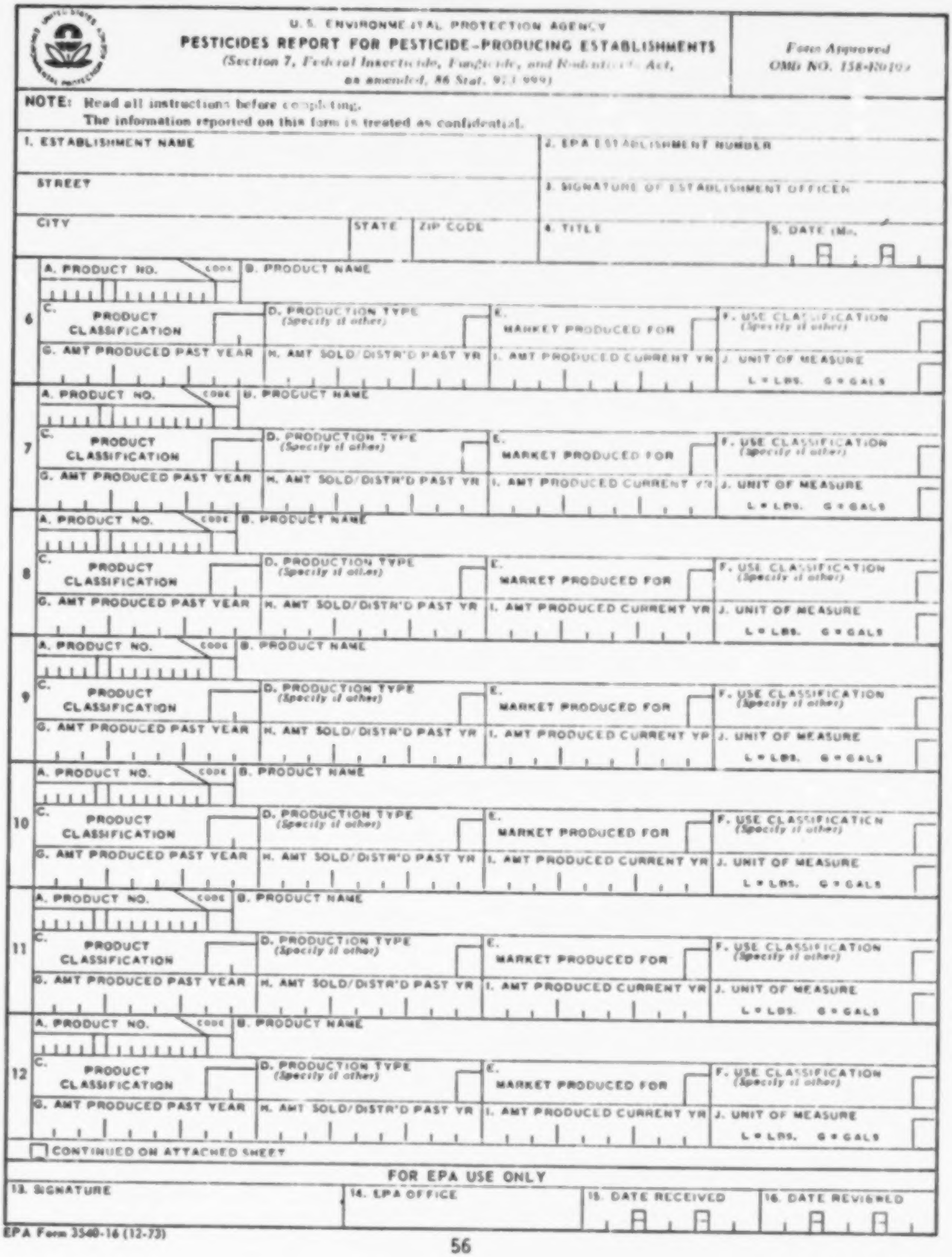
Sec. 167.4 provides that the only Establishment Registration Number which shall appear on the label is that of the final establishment at which the product was produced.

All products released for shipment by October 21, 1974 must bear the Establishment Registration Number regardless of the date of production. However, the Agency permits labeling by stickers, tags or stencils to minimize difficulties in adding Establishment Registration Numbers, particularly to products already in inventory. After the new label format is promulgated, the establishment number must appear as directed in the regulations.

Sec. 167.5 requires that pesticides reports be submitted annually for each establishment and that the reports include:

a. Name and address of establishment
b. Types of pesticides produced
c. Past year's amount of production and sales or distribution of each product
d. Amount of current production of each product (interpreted to mean the amount of planned production in the calendar year in which the pesticides report is submitted, including new products not previously sold or distributed). Exhibit 3 is a copy of the report form and instructions.

Exhibit 3.



U.S. ENVIRONMENTAL PROTECTION AGENCY

PESTICIDES REPORT FOR PESTICIDE-PRODUCING ESTABLISHMENTS

(Section 7, Federal Insecticide, Fungicide, and Rodenticide Act, as amended, 86 Stat. 973-999)

Form Approved OMB NO. 158-R0107

NOTE: Read all instructions before completing.
The information reported on this form is treated as confidential.

1. ESTABLISHMENT NAME
STREET
CITY | STATE | ZIP CODE
2. EPA ESTABLISHMENT NUMBER
3. SIGNATURE OF ESTABLISHMENT OFFICER
4. TITLE
5. DATE (Mo., Day, Yr.)

6
A. PRODUCT NO. | CODE | B. PRODUCT NAME
C. PRODUCT CLASSIFICATION | D. PRODUCTION TYPE (Specify if other) | E. MARKET PRODUCED FOR | F. USE CLASSIFICATION (Specify if other)
G. AMT PRODUCED PAST YEAR | H. AMT SOLD/DISTR'D PAST YR | I. AMT PRODUCED CURRENT YR | J. UNIT OF MEASURE L = LBS. G = GALS

7
A. PRODUCT NO. | CODE | B. PRODUCT NAME
C. PRODUCT CLASSIFICATION | D. PRODUCTION TYPE (Specify if other) | E. MARKET PRODUCED FOR | F. USE CLASSIFICATION (Specify if other)
G. AMT PRODUCED PAST YEAR | H. AMT SOLD/DISTR'D PAST YR | I. AMT PRODUCED CURRENT YR | J. UNIT OF MEASURE L = LBS. G = GALS

8
A. PRODUCT NO. | CODE | B. PRODUCT NAME
C. PRODUCT CLASSIFICATION | D. PRODUCTION TYPE (Specify if other) | E. MARKET PRODUCED FOR | F. USE CLASSIFICATION (Specify if other)
G. AMT PRODUCED PAST YEAR | H. AMT SOLD/DISTR'D PAST YR | I. AMT PRODUCED CURRENT YR | J. UNIT OF MEASURE L = LBS. G = GALS

9
A. PRODUCT NO. | CODE | B. PRODUCT NAME
C. PRODUCT CLASSIFICATION | D. PRODUCTION TYPE (Specify if other) | E. MARKET PRODUCED FOR | F. USE CLASSIFICATION (Specify if other)
G. AMT PRODUCED PAST YEAR | H. AMT SOLD/DISTR'D PAST YR | I. AMT PRODUCED CURRENT YR | J. UNIT OF MEASURE L = LBS. G = GALS

10
A. PRODUCT NO. | CODE | B. PRODUCT NAME
C. PRODUCT CLASSIFICATION | D. PRODUCTION TYPE (Specify if other) | E. MARKET PRODUCED FOR | F. USE CLASSIFICATION (Specify if other)
G. AMT PRODUCED PAST YEAR | H. AMT SOLD/DISTR'D PAST YR | I. AMT PRODUCED CURRENT YR | J. UNIT OF MEASURE L = LBS. G = GALS

11
A. PRODUCT NO. | CODE | B. PRODUCT NAME
C. PRODUCT CLASSIFICATION | D. PRODUCTION TYPE (Specify if other) | E. MARKET PRODUCED FOR | F. USE CLASSIFICATION (Specify if other)
G. AMT PRODUCED PAST YEAR | H. AMT SOLD/DISTR'D PAST YR | I. AMT PRODUCED CURRENT YR | J. UNIT OF MEASURE L = LBS. G = GALS

12
A. PRODUCT NO. | CODE | B. PRODUCT NAME
C. PRODUCT CLASSIFICATION | D. PRODUCTION TYPE (Specify if other) | E. MARKET PRODUCED FOR | F. USE CLASSIFICATION (Specify if other)
G. AMT PRODUCED PAST YEAR | H. AMT SOLD/DISTR'D PAST YR | I. AMT PRODUCED CURRENT YR | J. UNIT OF MEASURE L = LBS. G = GALS

☐ CONTINUED ON ATTACHED SHEET

FOR EPA USE ONLY

13. SIGNATURE
14. EPA OFFICE
15. DATE RECEIVED
16. DATE REVIEWED

EPA Form 3540-16 (12-73)

Exhibit 3.

INSTRUCTIONS FOR PESTICIDES REPORT FOR PESTICIDE-PRODUCING ESTABLISHMENTS (EPA Form 3540-16)

Section 7(c) of the Federal Insecticide, Fungicide, and Rodenticide Act, as amended (86 Stat. 987), requires any pesticide producer operating an establishment registered under Section 7(a) of this Act to inform the Administrator of the Environmental Protection Agency of the types and amounts of pesticides currently being produced, the types and amounts produced in the past year, and the types and amounts sold or distributed in the past year. To comply with this requirement, the Pesticides Report is to be completed and the original and first copy returned to the Regional Office of the Environmental Protection Agency having jurisdiction over the state in which the establishment is located (i.e., that office indicated on the accompanying transmittal letter).

ITEM

1 ESTABLISHMENT NAME, STREET, CITY, STATE, ZIP CODE, AND TELEPHONE NUMBER Enter the name and address (using the standard two-letter Postal Service state abbreviation) of the reporting establishment. Item must read as shown on the Notification of Registration of Pesticide-Producing Establishments. Enter the telephone number, including area code, of the reporting establishment in the blank space directly above Item 2, "EPA Establishment Number."

2 EPA ESTABLISHMENT NUMBER Enter the establishment registration number assigned to the reporting establishment.

3 SIGNATURE OF ESTABLISHMENT OFFICER An individual authorized to sign official documents for the establishment should enter his signature.

4 Self-explanatory

5 DATE Enter the date in month-day-year sequence.

Subitems A through J must be completed for each pesticide produced at the reporting establishment. This includes all EPA registered pesticides, pesticides produced while product registration is pending, pesticides produced under an Experimental Use Permit, pesticides produced for export only, and pesticides produced for shipment in intrastate commerce. If an establishment produces a product registered by a different company, the reporting establishment should include that product on its report. Pesticides sold or distributed by, but not produced at the reporting establishment, should not be reported. A pesticide produced under various distributor labels should be reported only as a single product and should not be reported separately for each distributor label.

A PRODUCT NUMBER/CODE

1 If product is registered, enter EPA product registration number: e.g., product registration number 123-1 would appear as 0 0 1 2 3 ▨ 1
Enter "1" under "Code".

2 If product has EPA product registration pending, enter EPA file symbol: e.g., file symbol 123-REG would appear as 0 0 1 2 3 ▨ R E G
Enter "2" under "Code".

3 If product is produced under an Experimental Use Permit, enter EPA permit number: e.g., permit number 123-EXP-111G would appear as 0 0 1 2 3 ▨ E X P - 1 1 1 G
Enter "3" under "Code".

4 If product does not come under any of the above, leave product number blank and enter "4" under "Code". In this case a Chemical Formulation Report must also be completed (instructions below).

B PRODUCT NAME Enter the name of the product. Must be the same as on the registered label. Maximum 60 characters.

C PRODUCT CLASSIFICATION Enter the one classification code best describing the product.

01 Insecticide
02 Fungicide
03 Rodenticide
04 Herbicide
05 Algaecide
06 Nematocide
07 Plant regulator
08 Defoliant or desiccant
09 Disinfectant, sanitizer, germicide, etc.
10 Antifouling paint

Exhibit 3.

D PRODUCTION TYPE Enter the code best describing the type of production.
  1 Technical material (for manufacturing use only)   3 Repackaging
  2 Formulation or blending   4 Other (specify)

E MARKET PRODUCED FOR Enter the code best describing the market for which the pesticide is produced.
  1 United States   3 Export out of United States only
  2 United States and export out of United States

F USE CLASSIFICATION Enter the code for the use assigned to the pesticide. This subitem cannot be completed until pesticides have been classified under Section 3(d) of the Act (86 Stat. 981).
  1 General Use   2 Restricted Use   3 Other (specify)

G AMOUNT PRODUCED PAST YEAR Enter the amount (pounds or gallons) of the product produced for distribution or shipment at the reporting establishment in the calendar year immediately prior to the year in which this report is submitted. Foreign establishments should report only the amount produced for shipment to the United States. All amounts should be entered in the following manner: e.g., 10,000 should appear as | | | | | |1|0|0|0|0|

H AMOUNT SOLD/DISTRIBUTED PAST YEAR Enter the amount (pounds or gallons) of the product sold or distributed (i.e., released for shipment) by the reporting establishment in the calendar year immediately prior to the year in which this report is submitted, regardless of when the product was actually produced. Foreign establishments should report only the amount sold or distributed in the United States.

I AMOUNT PRODUCED CURRENT YEAR Enter the amount (pounds or gallons) of the product to be produced at the reporting establishment in the calendar year in which this report is submitted. Foreign establishments should report only the amount intended for shipment to the United States. In all cases, this figure will be considered an estimate of the current year's production.

J UNIT OF MEASURE Enter the unit of measure used in subitems G, H, and I:
  1=pounds 2=gallons

If a continuation sheet is required, reproduce the form or otherwise provide the required information in identical format. Number all continuation sheets in the upper right-hand corner. Items 1-5 must be repeated on any continuation sheet.

It is a violation to knowingly falsify all or part of any information submitted on the Pesticides Report or Chemical Formulation Report (Section 12(a)(2)(M), 86 Stat. 991). The Pesticides Report will be treated as confidential.

INSTRUCTIONS FOR CHEMICAL FORMULATION REPORT

In addition to completing subitems A through J, a Chemical Formulation Report must be submitted for any pesticide produced at the reporting establishment meeting the following criteria:

1 Pesticide is not registered with EPA;
2 Pesticide does not have EPA product registration pending; and
3 Pesticide is not produced under an Experimental Use Permit

e.g., an unregistered pesticide produced solely for export out of the United States. The Chemical Formulation Report must include:

1 A list of the chemical names for each active and each inert ingredient used in the formulated product and the percentage of each by weight (total must equal 100%);
2 The EPA Establishment Number assigned to the reporting establishment;
3 The item number (6,7,8...) on the Pesticides Report and page number, if necessary, corresponding to the product for which the chemical formulation is given; and
4 The name of the product exactly as it appears in subitem B of the Pesticides Report.

The Chemical Formulation Report will be treated as confidential.

B. Economic impact, Section 7

Registration of establishment is, in itself, a one-time effort since registration will remain in effect provided the annual pesticide reports are submitted as required in Sec. 167.5 of the Section 7 Regulations.

Registration, in itself, requires the name and address of the company, type of ownership and the names and addresses of all producing establishments. Application for registration is made on the EPA Application for Registration of Pesticide-Producing Establishments form. The industry effort in effecting such registration is considered to be nominal and no cost is assigned.

The principal economic impact of Section 7 will result from the effort required to complete and submit the annual Pesticides Report as described in Reg. Sec. 167.5 in A above. A separate report must be submitted for each establishment for each product produced in that establishment to include data product classification, production type, market produced for, use classification, amount produced past year, amount sold/distributed past year and amount produced current year. Data needed to produce this report are required by Section 8, Books and Records, of 1972 FIFRA as amended and are specified in the Section 8 Regulations (39FR 33514) section 169.2 which requires records on quantities of pesticides produced, received, shipped or delivered and inventories. These records will provide data necessary for completion of items G, H and I of the Pesticide Report. Items A, B, C, D, E and F do not require data but are descriptive of the product, its market and use and should present no problem.

It is recognized that the effort required to produce the information required for the annual pesticide report will vary by firm according to the number of establishments within the firm for which reports must be prepared and also with the number of products produced at each establishment. In addition, the procedures used by the firm to maintain these records will influence the effort, and the cost, necessary to extract the data required by the Pesticides Report. Those firms, primarily the larger companies, which have computerized record systems, may be able to extract the required information rapidly and relatively inexpensively as compared to smaller firms dependent on manual record systems.

Although data for items A through H on the Pesticide Report could be determined largely by a senior clerk, item I (amount produced current year), may require sales forecasts and would require the judgment of product managers within the firm. In addition, the completed report would need to be reviewed, approved and signed by an officer of the firm.

There are approximately 35,500 pesticide products registered with EPA. EPA Pesticides Enforcement Division reports that there were as of July 1975, approximately 3,398 firms operating 5,352 establishments registered with EPA. This would indicate that there are, as an average, approximately 10 products produced per firm and 7 products produced per plant in the pesticides industry.

With 3,398 firms and 5,352 establishments, this would mean an average of 1.6 plants per firm. However, a high proportion of the firms in the industry are single-plant firms.

Since no data exist on the costs to industry for preparing EPA Pesticide Reports as required by Section 7, contacts were made with firms in the industry to get their estimate of the effort and cost which would be required to complete these data and to prepare the required reports.

The following assumptions have been made in estimating the costs of preparing Section 7 Pesticide Reports from data which the firms must maintain as a requirement of Section 8.

(1) Compilation and analysis of information and data required for items A through H plus J and background data for I.

  (a) To be done by a senior clerical employee, salary $12,000 per year or $46 per day with 100 percent overhead on direct labor (to cover all personnel benefits, company general and administrative costs and other overhead items), resulting in a cost of $92 per day for this employee.

  (b) Time required by (a) to compile and summarize information and data required = one day per product or $92 per product.

(2) Review of background data for item I (amount produced per current year) and development of production estimates if necessary plus review and approval of report.

  (a) To be done by an officer of the company or by a senior managerial employee, salary $26,000 per year or $100 per day plus 100 percent overhead, resulting in a cost of $200 per day for this employee.

  (b) Time required - two hours per establishment or $50 cost.

Based on these assumptions, the industry aggregate cost for preparing Section 7 Pesticide Reports, is estimated as follows:

Clerical time, 35,500 products x $ 92 per product	=	$3,266,000
Managerial review time 5,352 establishments x $50	=	$ 267,600
Total estimated Section 7 costs to industry		$3,533,600

Average cost per firm	=	$1,040.00
Average cost per establishment	=	$ 660.00
Average cost per product	=	$ 99.54

V. Economic Impact - Section 8, Books and Records

A. Requirements

> Section 8 of the Act provides that " the Administrator may prescribe regulations requiring producers to maintain such records with respect to their operations and the pesticides and devices produced as he determines are necessary for the effective enforcement of the the Act." The regulations, as proposed, set forth the scope and types of books and records required to be maintained by producers of pesticides and devices, the periods of time that such books and records are to be retained, and the procedures to be followed in the inspection of such books and records." 1/

Sec. 169.2 of the EPA Rules and Regulations for 1972 FIFRA as amended (39 FR 3515), states, under Maintenance of Records:

> "All producers of pesticides or devices subject to this Act, including pesticides produced pursuant to an experimental use permit, shall maintain the following records:
>
> (a) Records showing the product name, EPA Registration Number, Experimental Permit Number if the pesticide is produced under an Experimental Use Permit, amounts per batch and batch identification (numbers, letters, etc.) of all pesticides produced. In cases where a pesticide is not registered, is not the subject of an application for registration, or is not produced under an Experimental Use Permit, the records shall also show the complete formula. The batch identification shall appear on all production control records. These records shall be retained for a period of two (2) years.
>
> (b) Records showing the brand names and quantities of devices produced. These records shall be retained for a period of two (2) years.
>
> (c) Records showing the following information regarding the receipt of all pesticides and devices:
>
> (1) Brand name of pesticide or device.
> (2) Name and address of shipper.
> (3) Name of delivering carrier.
> (4) Date received, and
> (5) Quantities received.

1/ Pub. Law 92-516, Section 8, page 15.

These records are not intended to cover receipt of pesticides used for in-plant maintenance, extermination or sanitation programs, etc. Shipping and receiving documents such as invoices, freight bills, receiving tickets, etc., which provide the required information will be considered satisfactory for the purposes of this section. These records shall be retained for a period of two (2) years.

(d) Records showing the following information regarding the shipment of all pesticides and devices.

(1) Brand name of pesticide or device.

(2) Name and address of consignee and where the pesticide is produced pursuant to an experimental use permit the information required under Section 5 and any regulations promulgated thereto regarding the distribution of such pesticides.

(3) Name of originating carrier.

(4) Date shipped or delivered for shipment, and

(5) Quantities shipped or delivered for shipment.

Such records are required regardless of whether any shipment or receipt of shipment is between plants owned or otherwise controlled by the same person. Shipping and receiving documents such as invoices, freight bills, receiving tickets, etc., which provide the required information will be considered satisfactory for the purposes of this section. These records shall be retained for a period of two (2) years.

(e) Inventory records with respect to the types and amounts of pesticides or quantities of devices in stock which he has produced. These records may be disposed of when a more current inventory record is prepared.

(f) Copies of all domestic advertising of restricted uses of any pesticide registered for restricted use for which the producer is responsible including any radio or television scripts for all such pesticides. These records shall be retained for a period of two (2) years.

(g) Copies of all guarantees given pursuant to section 12(a) (2) (C) of the Act. These records shall be retained for a period of one (1) year after expiration of the guarantee.

(h) In the case of pesticides or devides intended solely for export to any foreign country, copies of the specifications or directions of the foreign purchaser for the production of the pesticides or devices. These records shall be retained for a period of two (2) years after expiration of the contract.

(i) Records on the method of disposal (burial, incineration, etc.) date or dates of disposal, location of the disposal sites, and the types and amounts of pesticides disposed of by the producer or his contractor. With regard to the disposal of containers accumulated during production, the Agency will consider satisfactory a statement, attested to by a responsible firm official, describing in general terms the method and location of disposal, e.g., all containers are taken periodically to a certain site. Records of deviations from normal practice must be maintained. In addition any records on the disposal of pesticides and/or containers specified pursuant to section 19 of the Act and any regulations promulgated thereto shall also be maintained. The above requirements apply to those products bearing label instructions for disposal and to any other products specified under any regulations promulgated pursuant to section 19. These records shall be retained for twenty (20) years or may be forwarded after three (3) years to the Environmental Protection Agency Regional Administrator for maintenance.

(j) Records of any tests conducted on human beings whether performed by the producer himself or authorized and/or paid for by the producer. Such records shall include: the names and addresses of subjects tested, dates of tests, types of tests, written consent of subjects to test and all information and instructions given to the subjects regarding the nature and purpose of the tests and of any physical and mental health consequences which were reasonably foreseen therefrom, and any adverse effects of the tests on the subjects, including any such effects coming to the attention of the producer after completion of the tests. These records shall be retained for twenty (20) years or may be forwarded after three (3) years to the Environmental Protection Agency Regional Administrator for maintenance.

(k) Records of any factual information coming to the attention of the producer regarding any unreasonable adverse effects on the environment including water, air, land, and all plants and man and other animals living therein by any pesticide produced by him. These records shall be retained as long as the registration is valid and the producer (including its successors or assigns) is in business or for a period of two (2) years after such information is submitted to the Administrator pursuant to section 6(a) (2) of the Act.

(l) Records containing research data relating to registered pesticides. These records shall be retained as long as the registration is valid and the producer is in business."

B. Evaluation of Requirements

Each of the 12 records categories was reviewed subjectively in order to determine those categories which might pose significant, incremental problems to industry. It is recognized that many of the types of records required by Section 8 are, or should be, maintained by pesticide firms as standard business practice. These records should not be considered as incremental records required by the Act since they should be kept as a normal part of the business of the firm.

The review of the specified records categories resulted in the following conclusions:

1. Records on product names, EPA registration numbers, EPA experimental permit numbers, brand names and quantities produced and shipped, files on receipt and shipment of pesticides as evidenced by invoices etc., inventory records, advertising, guarantees, export specifications, tests on humans and research data records pose no special problems to the industry.

2. Some additional records effort may be required in reporting to EPA factual information on unreasonable adverse effects. Although most companies will keep records of such incidents, the degree of documentation, the formality of the submission of written reports to EPA plus resulting follow-up discussions will, in most instances, require additional effort and costs to the industry.

3. The principal impact on firms, in terms of books and records, will result in two areas - the need for maintaining records on batch numbers and shipment by batches and the requirements for the maintenance of disposal records.
   a. The batch number problem - The purpose of batch number records, as stated in the Federal Register (39 FR 33513) is as follows: "Most of the required records (those pertaining to

production, shipment, inventory, batch identification and quantity) will enable the Agency to identify, track and isolate violative batches or shipments of pesticides. In this way the effectiveness of EPA stop sale, use, or removal orders and seizures pursuant to section 13 of the Act will be greatly enhanced, while the producer and the Agency will be spared actions against non-violative shipments." Several possible problem areas arise. It is understood that neither the Act nor the Rules and Regulations require the recording of batch numbers on individual containers. However, in order to identify the disposition of product by batch number, it will be necessary to identify batch numbers, dates, consignees and destinations on all invoices, shipping manifests or other similar documents. The problem becomes increasingly complex where pesticides are shipped by the manufacturer or formulator to an intermediate warehouse, reshipped to a distributor and/or dealer and finally sold to the final user.

b. Disposal records - a specific incremental requirement of the Act requires complete records on the disposal of pesticides by the producer or his contractor. Disposal records must show method of disposal, dates, location of disposal sites, and the types and amounts of pesticides disposed of. Records on disposal of used containers, accumulated during production, are more general and need only describe in general terms the usual practice in container disposal together with records of deviation from normal practice.

Although the maintenance of required books and records will present problems to industry, a greater problem will occur in those instances where it is necessary to search these records to retrieve data for tracing pesticides, by product and batch number when situations requiring such information arise. Shipments, reshipments, inventories and retail sales records must be maintained in a system which will permit such identification. Larger firms may be able to computerize record systems which will permit such search by computer programs. The situation will be more difficult for smaller firms which depend primarily on manual record systems.

C. Economic Impact

As of July, 1975, the Enforcement Division of EPA, reported that there were 3,398 firms which would be required to maintain books and records as required by Section 8 and which would have to make these records available for EPA inspection on demand.

It is obvious that the complexity and the cost of maintaining required records will vary substantially from firm to firm depending on the size of firm, the number of establishments maintained, the number, type and volume of products sold, types and numbers of customers served and distribution systems employed.

No single cost can be assigned to this function, by product or by firm, and contacts with industry produced widely-varying estimates of incremental costs associated with record maintenance.

In order to develop an estimate of the cost of establishing and maintaining in usable form records which will permit the tracing of receipts and shipments by batch number and which will provide an accurate record of all disposal operations, a series of assumptions were made, as follows:

1. Distribution of firms by size - This distribution was made on the basis of Census data plus membership in major trade associations as follows:

Category	Est. no. of firms
Large, basic manufacturers/formulators	50
Large formulators	500
Medium sized formulators	1,000
Small formulators	1.848
Total	3,398

2. Man/days time for records maintenance was estimated as follows:

Category	Man/days
Large, basic manufacturers/formulators	130
Large formulators	65
Medium formulators	20
Small formulators	10

3. Salary, records personnel plus overhead was estimated as follows:

Category	Annual Salary	Daily Salary	Overhead (100 %)	Total
Large, basic manufacturer/ formulator	$10,000	$38.46	$38.46	$76.92
Large formulator	9,000	34.62	34.62	69.24
Medium formulator	8,000	30.80	30.80	61.60
Small formulator	8,000	30.80	30.80	61.60

4. Total costs were calculated as follows:

Category	Man/days firm	Cost/ day	Cost/ firm	No. firms	Total Cost
Large, basic mfg./ formulator	130	$76.92	$10,000	50	$ 500,000
Large formulator	65	69.24	4,500	500	2,250,000
Medium formulator	20	61.60	1,232	1,000	1,232,000
Small formulator	10	61.60	616	1,848	1,138,368
Total	-	-	-	3,398	$5,120,368

VI. Economic Impact - Section 9, Inspection of Establishments

A. Requirements

Section 9 of the 1972 Federal Insecticide Fungicide and Rodenticide Act as amended provides that, "for purposes of enforcing the provisions of this Act, officers or employees duly designated by the Administrator are authorized to enter at reasonable times, any establishment or other place where pesticides or devices are held for distribution or sale for the purpose of inspecting and obtaining samples of any pesticides or devices, packaged, labeled, and released for shipment, and samples of any containers or labeling for such pesticides or devices."

B. Procedures

The Act specifies the following procedures,

> "Before undertaking such inspection, the officers or employees must present to the owner, operator, or agent in charge of the establishment or other place where pesticides or devices are held for distribution or sale, appropriate credentials and a written statement as to the reason for the inspection, including a statement as to whether a violation of the law is suspected. If no violation is suspected, an alternate and sufficient reason shall be given in writing. Each such inspection shall be commenced and completed with reasonable promptness. If the officer or employee obtains any samples, prior to leaving the premises, he shall give to the owner, operator, or agent in charge a receipt describing the samples obtained and, if requested, a portion of each such sample equal in volume or weight to the portion retained. If an analysis is made of such samples, a copy of the results of such analysis shall be furnished promptly to the owner, operator, or agent in charge." 1/

C. Economic Impact

The Enforcement Division, EPA, reported that in July, 1975, there were 5,352 registered establishments subject to inspection under the requirements of Section 9 of the Act. The Enforcement Division estimates that it will conduct inspections of from 1,500 to 2,000 establishments per year. They report that time required for inspection for most establishments averages one-half a day although for large plants, one or more days may be required.

1. Types of costs to the firm

Possible costs associated with EPA inspection of establishments should include the following:

1/ Public Law 92-516, Section 9, page 16.

- Loss of product
- Damage to containers and repackaging required
- Costs of verifying lab tests
- Personnel escort costs.

a. Loss of product and damage to containers -- one of the functions of the EPA plant inspector is to take samples of products. According to the Enforcement Division, EPA, samples of products must be taken from merchandise which has been released for sale. This usually means that sealed cartons or other containers must be opened. If requested by the establishment being sampled, the inspector will take duplicate samples and turn over one to the firm for its use in verification lab tests. This means that if a case of quart cans of pesticide is sampled, two quarts will be taken, or if a bag is sampled, through the air vent or by a probe, two samples will be taken. Although the EPA inspectors are equipped to reseal cartons, bags, etc., most firms are reluctant to ship cartons that have been opened, so the cartons or bags are sent back to the carton sealer or bagger for replacement of product and repackaging and then must be returned to the warehouse to maintain warehouse lots intact. This process necessarily involves plant labor and occasions some disruption of the normal flow of production.

b. Costs of verifying lab tests -- If EPA analyzes samples taken, then the manufacturer or formulator will, in many instances have comparable analyses made, either in his own lab or in a commercial lab, for the purpose of verifying the EPA analyses. Although such verifying analyses are not required by Section 9, they result from the desire by industry for such verification, and are therefore a cost related to Section 9 procedures.

c. Personnel escort costs -- No manufacturer or formulator will allow unescorted, non-company personnel, official or unofficial, unaccompanied access to the plant. Liability considerations plus other factors associated with visitor safety and company policies require that visitors be escorted. In addition, the company escort would be able to answer questions and otherwise assist the inspector in his visit to the plant. As stated earlier, EPA Enforcement Division estimates that an average inspection will require one-half day with one or more days being required for larger establishments.

2. Cost estimates

Estimates of costs to the industry resulting from inspection of establishments inspected per year (EPA estimates they will inspect 1,500 to 2,000 per year). This would mean that the 5,352 registered establishments would be inspected on a three-year cycle.

Estimates of inspection costs to the firm resulting from the requirements of 1972 FIFRA, as amended, were developed as follows.

a. Product losses from samples taken -- Costs to industry are considered to be nominal. Samples taken will be relatively small and although it is possible for EPA to reimburse firms for product samples, it is doubtful that many such claims would be submitted. It is recognized that the samples taken have value, but because of the relatively small amounts taken and the possibility of submitting claims for value of such products, no cost has been assigned to product losses.

b. Costs of replacing opened cartons -- As was described in Part C, 1, a of this report, EPA inspectors will be sampling from warehouse stocks which will necessitate their opening cartons, cans or sacks or probing sacks to obtain samples.

Manufacturers or formulators would be reluctant to deliver to customers cartons which had been opened and resealed, five gallon cans etc. on which seals had been broken and product extracted or small bags (5 to 15 pounds) which had been probed and product removed. In addition to sending an obviously damaged carton or container, these containers (e.g. 5-gallon cans or small bags) would be underweight in terms of product contents. For larger containers, e.g. 50-pound bags or a 30-gallon drum, the removal of a small, e.g. 1/2-lb. sample would not be sufficiently serious to require repackaging. Common packaging units are illustrated by the following products.

Product	Package Unit
AAtrex 80 W	10 x 5 lb. or 25 lb.
AAtrex 4 L	6 x 1 gal, or 5 gal or bulk
Amiben 10 G	50 lb
Amiben 2 LC	5 gal
Bladex 80 W	5 x 10 lb
Bladex 4 WDS	4 x 1 gal or 5 gal
Cygon 2.67	30 gal
Diazinon AG 500	6 x 1 gal or 5 gal
Furadan 10 G	30 lb.
Furadan 4 F	4 x 1 gal
Lasso II	50 lb
Lasso 4 EC	5 gal
Lorox 50 WP	12 x 4 lb
Milogard	10 x 5 lb.
Paraquat	4 x 1 gal
Sevin 80	4 x 10 lb
Tenoran 50	10 x 6 lb
Toxaphene	2 x 1 gal
Treflan 4 EC	12 x 1 qt or 5 gal

Other examples could be cited, but these illustrate the common package units for agricultural pesticides as follows.

Liquid	Dry
12 x 1 qt	12 x 4 lb
4 - 6 x 1 gal	10 x 5 lb
5 gal	25 - 30 lb
30 gal	50 lb

In general, consumer pesticides would be in smaller containers -- less than one gallon, less than 5 pounds, or aerosol cans in cartons of 10, 12, 24, 48 or 96 units.

There are in excess of 30,000 pesticides registered with EPA. Data are not available on the number of pesticides for which samples would be taken during the course of inspection of establishments. The annual cost estimate for replacing broken cartons or cans or bags from which samples were taken, is based on the following assumptions.

a. One third of the plants sampled per year.

b. 10,000 products subject to sampling each year with many products, packaged in different sizes and types of containers.

c. 10,000 actual samples taken each year from containers which would have to be replaced.

d. Average cost per container (carton, bag, box, can etc.) = $1.00.[1]

e. Time lost in removing opened containers, replacing contents in new containers and replacing containers in warehouses -- one-half hour per container.

f. Labor cost per container replaced = one-half hour @ $7.70 per hour ($8,000 salary + 100% OH) = $3.85.

On this basis, the cost on an annual basis for replacing samples and opened containers could be 10,000 samples x $4.85 = $48,500.

C. Costs of verifying lab tests -- as was indicated under b, if samples are taken for analysis, a duplicate sample or a portion of each such sample shall be given to the firm, upon their request. This sample would then be analyzed by the firm to verify the analysis done by EPA. This verifying analysis, by the firm, is not required by the Act and if done, is done by choice of the firm. It is recognized that the running of such analyses results in a cost to the firm, but since it is not required by the Act, this cost is not included. The cost of such verifying tests is estimated at $25 to $50 per sample or for 10,000 samples, $250,000 to $500,000 per year.

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[1] Calculated on the basis of a weighted average of distribution of types and sizes of containers used by pesticide manufacturers and formulators and container costs as of August, 1975. Actual weighted average was $1.07.

d. Personnel escort costs -- EPA, Enforcement Division estimates that the average inspection requires one-half day and that inspection of larger plants requires one day or more. There was, in July 1975, a total of 5,352 registered establishments subject to inspection. EPA estimates that they will inspect approximately 1,800 plants per year. If it is assumed that 10 percent of these plants are in the "large" category and require a full day for inspection then the man-days per year required for plant inspection would be as follows:

180	large plants, 1 day each	=	180 man/days
1,620	other plants, 1/2 day each	=	810 man/days
1,800	Total plants		990 man/days

Based on the assumption that the plants would furnish an escort to accompany the EPA inspector, this would then require 990 man/days of escort time.

Since the escort must be a responsible employee, but not necessarily a managerial employee, a salary rate of $18,000 per year or $69 per day plus 100 percent overhead equals $138 per day represents the company cost. At this rate, 990 man days would result in a total annual cost of $136,620.

e. Total annual industry costs associated with plant inspections equals the sum of

(1)	Container replacement	=	$ 48,500
(2)	Escort costs		136,620
			$185,120

This cost does not include allowance for products taken as samples or for verifying lab tests made by the company.

VII. Economic Impact - Section 12-G, Use Inconsistent with Labeling

A. Requirements

Section 12-G of the Federal Insecticide, Fungicide and Rodenticide Act of 1972, as amended states: "It shall be unlawful for any person to use any registered pesticide in a manner inconsistent with its labeling."

This requirement has been interpreted by EPA to prohibit the application of pesticides at dosages greater than label recommendations and to permit application at doses lower than the label application rate for agricultural uses only under two situations:

1. Where such use is part of an integrated pest management program and such use is:

    a. recommended in writing to the licensor agency by, and is supervised by and/or carried out by a State licensed pest management consultant, or

    b. recommended and authorized in writing by an official State agency, or

2. Where a lesser dose is recommended in writing or in printed material by Cooperative State Extension Personnel, State Experimental Station personnel or other authorized State agency, personnel as being efficacious under the particular environmental circumstances.

On the basis of this memorandum, Pesticide Enforcement Policy Statement No. 1 40FR 19529, summarized the requirements for less-than-label application as follows:

> "The Agency has determined that an application or use of a registered pesticide at a lower dosage rate than that recommended on the accepted label will be permitted if such application or use
> (a) is recommended in writing by a knowledgeable expert
> (b) is efficacious against the target pest and has only beneficial effects to man and the environment
> (c) is performed in accordance with all other label instructions and precautions, and
> (d) is not repeated at the low dosage rate so frequently as to result in a total pesticide dosage higher than that specified on the approved label."

The reduced rate application of a rodenticide, termite control product or antimicrobial agent such as a disinfectant, sanitizer, or fungicide under any circumstance is prohibited.

B. Recommendation of Knowledgeable Expert

Must be a recognized expert in pest control practices. Recognized authorities are often employed by such organizations as State Cooperative Extension Services, State Agricultural Experiment Station, Federal or State departments or agencies, State and Federal Public Health Services. Independent pest management specialists and pest management consultants are also considered to be competent to make less-than-label-dose recommendations.

Recommendations must be in writing and may be made in a general statement or published document through current scientific journals, textbooks, manuals, technical bulletins or by specific written instructions from a qualified person to the individual.

Responsibility for the safe and efficacious use of the pesticide and for full compliance with the terms of Pesticide Enforcement Policy Statement No. 1 may rest with either the user or the recommending expert, or both.

C. State Reaction to Recommending Less-Than-Label Rates

Contacts were made with State Extension Service Directors, State Pesticide Coordinators, Extension Agronomists and Entomologists, by letter and by telephone to determine their attitudes toward recommending less-than-label rates for pesticides. Twenty-seven states were willing to comment on this problem. Half (14) reported that they would not recommend less-than-label rates. A major concern was related to their liability for such recommendations (see B above). Half (13) indicated that although they would be willing to recommend less-than-label rates, they would do so only in those cases where they had sufficient data (some mentioned 3 years) to justify the rate and then only in very selective uses.

The general attitude of private pest control firms is that, unless they have adequate data from State extension or experiment station personnel, they will not recommend less-than-label rates.

D. Types of Economic Impacts of Less-Than-Label Rate Application Regulations

The requirement that all pesticides must be applied at label rates, unless a written less-than-label rate recommendation is obtained, will have its primary impact on agricultural users of pesticides.

If the farmer is required to use full label rates under circumstances where less-than-label rates would be indicated, one or more of the following adverse impacts could result:

1. Pesticide would be wasted in that quantities above that required to obtain effective control would be used. This would represent a direct increased cost to the farmer.

2. Crop damage could result (phytotoxicity) to growing crops, e.g. root and/or foilage damage from herbicides, under certain circumstances where soil types or climatic conditions dictate lower rates.

3. Normal crop rotations could be disrupted as damage could result to crops planted during the same season, e.g. corn followed by winter wheat.

4. Injury could result to crops planted on the same ground the following year (pesticide residues).

In some situations, it may be possible for the farmer to shift to a different type of pesticide which may give adequate control at label rates or which may have less toxic residual effects. However, in general, these substitute pesticides will be more costly or less effective or both. Otherwise they would be in common use at the present time.

The economic costs resulting from problems in using full-label rates will arise from two sources:

1. Increased cost of pesticides where label recommendations result in use of greater amounts than normally would be applied.

2. Possible damage to existing or following crops.

In addition to the economic impacts, there would be an environmental impact which would result from the introduction into the environment of greater amounts of pesticides than would have been required if less-than-label rates were used.

E. Quantitative Economic Impacts of Less-Than-Label Rate Applications

The determination of the precise economic impact resulting from the enforcement of Section 12-G is not possible. Adequate information is not available on the existing acreage of specific crops treated with less-than-label recommended rates where control is acceptable at reduced rates. Adequate data are not available on the yield losses which result from using the recommended rate where crop injury could result since losses will vary from year-to-year as affected by climatic conditions and other production variables. Finally, it is impossible to predict with known reliability, the number and types of situations where farmers will be willing and able to get written recommendations for less-than-label rates from "knowledgeable experts."

However, certain information is available which can be used to provide illustrations of situations where economic impacts would result.

1. Half of the states contacted in this study indicated that they would be unwilling to recommend less-than-label rates. Included in this group were five major corn producing states and four major wheat and sorghum producing states.

2. It has been observed that under certain soil or moisture conditions application of certain herbicides at label rates will result in damage to growing crops and/or residual damage to crops which follow on the same ground.

3. Problems resulting from greater-than-required pesticide applications affect major field crops, including corn, soybeans, cotton, grain sorghum, wheat and other small grains, which constitute major sources of crop revenue for sales into both domestic and export markets.

4. Overuse of pesticides, in terms of greater-than-required applications for conditions encountered results in greater-than-required pesticide expenditures by the farmer.

Examples of situations where less-than-label rates are used were cited by university agricultural experiment stations contacted during this study.

Table 18 illustrates some of the situations reported by agricultural experiment stations.

As opposed to the possibility of losses which may occur if label recommendations are required in situations where less-than-label application rates would be adequate, the EPA guidelines and regulations specifically provide that less-than-label rates may be applied where written recommendations from "knowledgeable experts" are possessed by the user. This requirement is subject to interpretation as is the enforcement of the requirement.

Although there may be situations where farmers, other users or applicators fail to obtain recommendations for less-than-label applications, and where amounts of pesticides applied are greater than necessary, there is no way of accurately estimating the number of types of such situations which may exist. It is expected that Section 12-G will result in economic costs, from excess use of pesticides and in possible crop damage to existing or follow-on crops. Half of the states responding to inquiries concerning 12-G (14 out of 27) indicated that they would not make less-than-label recommendations for pesticides. The excess pesticide costs shown in Table 18, represented by illustrations from 10 states, total in excess of $19,500,000. Of this amount, $17,400,000 was represented by crops in states which indicated that they would not make less-than-label recommendations. If the assumption is made that excess pesticide useage as illustrated in Table 18

Table 18. Illustrations of situations where less-than-label rates of applications of pesticides are recommended [1]

Crop and State	Type of pesticide	Recommended reduction below label rate		Reason for lower recommended rate	Acres affected	Pesticide saved by lower rate	Pesticide price	Value of pesticide saved
		Amount	Percent					
		(lb.)				(lb.)		
Corn								
Illinois	Herbicide	1-1.5	33-50	Effective weed control on soils in S. Illinois at lower rate -- avoid residual carryover on winter wheat or soybeans.	1,300,000	1,300,000	$2.95/lb.	$3,835,000
Iowa	Herbicide	1.5	40	Effective control at lower rate, carryover injury to beans on high pH soil.	300,000	450,000	2.95/lb.	1,327,500
Indiana	Herbicide	1.0	33	Effective weed control at lower rate, reduces residual damage.	1,200,000	1,200,000	2.95/lb.	3,540,000
Minnesota	Herbicide	1.0	33	Effective at lower rates, avoid residual damage to wheat and beans.	1,000,000	1,000,000	2.95/lb.	2,950,000
Ohio	Herbicide	1.0	33	Effective in given situations at lower rate.	800,000	800,000	2.95/lb.	2,360,000
Soybeans								
Illinois	Herbicide	0.5	25	Higher rate results in injury to crop.	270,000	135,000	3.70/lb.	499,500
Louisiana	Insecticide	0.75	--	Adequate control with lower rate.	250,000	187,500	1.12/lb.	210,000
"	"	0.25	--	" " " " "	250,000	62,500	5.44/lb.	340,000
Grain Sorghum								
Kansas	Herbicide	1.0	33	Effective at lower rate, heavier applications can injure crop under adverse conditions.	600,000	600,000	3.20/lb.	1,920,000
Nebraska	Herbicide	0.6	20	Effective at lower rate.	750,000	450,000	3.20/lb.	1,440,000
Texas	Insecticide	0.5	--	Gives economic control at lower rate.	250,000	125,000	1.68/lb.	210,000
Cotton								
Arkansas	Herbicide	0.25	20	Cotton will not tolerate label recommendations on low organic soil.	200,000	50,000	5.85/lb.	292,500
Tobacco								
N. Carolina	Insecticide	1.0	33	Lower rate gives effective control.	128,000	128,000	5.03/lb.	644,000

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[1] These examples represent only a partial sampling of a wider number of situations which exist illustrated from examples from State Agricultural Experiment Stations.

is representative of situations which occur in other states, that half of the states would not make less-than-label recommendations and that losses would be in proportion to total crop acreage, then direct cash costs due only to the value of excess pesticides used would be approximately $19,200,000. This cost was calculated as follows:

1.	Costs illustrated in Table 18	$19,568,000
2.	Crop acreage in states shown divided by U.S. total crop acreage	50.9%
3.	Estimated cost if no state makes "less-than-label" recommendations	$38,400,000
4.	Estimated cost if 50 percent of states make "less-than-label" recommendations	$19,200,000

It must be recognized that this cost estimate represents only the value of excess pesticides used and does not include any estimate of loss or damage to growing crops or to follow-on crops.

VIII. Economic Impact of Section 19 - Pesticides and Pesticide Container Disposal and Storage

A. Introduction

The Federal Insecticide Fungicide, and Rodenticide Act of 1947, did not regulate disposal or storage of pesticides or pesticide containers. In the 1972 Federal Insecticide, Fungicide and Rodenticide Act as amended, the administrator is specifically directed to establish procedures and regulations for the disposal or storage of packages and containers of pesticides and for disposal or storage of excess amounts of such pesticides, and accept at convenient locations for safe disposal a pesticide for which the registration has been canceled under Section 6(c) if required by the owner of the pesticide. The agency will accept the pesticide from Section 6(c) after the owner of the pesticide has made reasonable effort to return the material either to its manufacturer, distributor or to another agent capable of using the material.

B. Procedures not Recommended for Disposing or Storage

The Agency has determined that some methods of pesticide disposal and storage are so likely to cause unreasonable adverse effects on the health or the environment that the best form of regulation is to prohibit such acts.

Prohibited disposal methods

No person shall dispose of or store any pesticide or dispose of or store any pesticide container or container residue by:

1. Open dumping

   No pesticide, pesticide-related waste, pesticide container, or residue from a pesticide container shall be disposed of in a manner which does not protect the environment and is exposed to the elements, vectors and scavengers.

2. Open burning

   No pesticide, pesticide container or pesticide container residue shall be disposed of by open burning; except, the open burning by the user of small quantities (quantities emptied in a single day) of combustible containers formerly containing organic or metallo-organic pesticides, except organic mercury, lead, cadmium, or arsenic compounds, is acceptable when allowed by State and local regulations. The burning must take place in open fields away from people, water and animals and must avoid contamination of surface and groundwater.

3. Water dumping or ocean dumping

No pesticide, pesticide-related waste, pesticide container shall be stored or disposed of in a manner or to cause or allow contamination with water except in conformance with regulations developed pursuant to the National Marine Protection, Research and Sanctuaries Act of 1972 and the Federal Water Pollution Control Act as amended.

4. Contamination of food and feed supplies

No pesticide or pesticide-related waste that is classified as highly toxic or moderately toxic and so labeled shall be disposed of or stored in proximity to and in such manner as to cause direct exposure which could cause contamination of food or feed, or food or feed package materials.

5. Well injection

No pesticide, pesticide-related waste, pesticide container, or residue from a pesticide container shall be disposed of by well injection without the proper approval from the appropriate State agency. Also it must be demonstrated that other methods of disposal were investigated and found unsatisfactory in terms of environmental considerations.

6. So as to violate any Federal and State pollution Control Standards.

7. So as to violate any applicable provision of the Act.

C. Recommended Procedures for Disposal of Pesticides

Procedures for disposing of

1. Organic pesticides except those containers - organic mercury, lead, cadmium and arsenic
   Dispose as directed in 165.8(a) 1-6. [1]

2. Metallo-organic pesticides except those containing organic mercury, lead, cadmium or arsenics
   Dispose as described in 165.8(b) 1-6. [1]

3. Organic mercury, lead, cadmium, arsenic and all inorganic pesticides.
   Dispose as described in 165.8(c) 1-3. [1]

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[1] 39 FR 15239, 15240.

D. Recommended Procedures for the Disposal of Containers and Residues

1. Group I Containers

Combustible containers formerly containing organic or metallo-organic pesticides except organic mercury, lead, cadmium or arsenic can be incinerated or buried in specific designed land fills as noted in 165.8(a) 1/. Exceptions are small quantities of containers used in one day which can be burned in open fields with due caution by the user where permitted by the State and local regulations, or buried singly by the users in open fields.

2. Group II Containers

Non-combustible containers that contain organic or metallo-organic pesticides except organic mercury, lead, cadmium or arsenic should be triple-rinsed and contents added to the spray tank. Containers then can be disposed of by returning to manufacturer, recondition for reuse, recycle as scrap metal or disposed of in a sanitary landfill after crushing and puncturing to conform to regulations. Unrinsed containers must be disposed of in a specially designated land fill or incinerated in a pesticide incinerator.

3. Group III Containers

Any container formerly containing organic mercury, lead, cadmium or arsenic or inorganic pesticides after triple-rinsing and puncturing may be disposed in a sanitary landfill. If not rinsed containers are to be encapsulated and buried in specially designated landfill.

4. Residual Disposal

Residues and rinse liquids should be added to spray tank and used in field. If not, destroy as specified in 165.8 1/.

E. Recommended Procedures and Criteria for Storage of Pesticides and Pesticide Containers

1. General

a. Pesticides and excess pesticides and their containers should be stored only in places where adequate measures are taken to assure personal safety, accident prevention and prevention of potential environmental damages.

1/ 39 FR 15239-15240.

These precautions should occur where pesticides with signal word Danger, Poison or Warning, or the skull and crossbones symbol on the label are stored. These procedures are not necessary at facilities where most pesticides used in the home and garden, or pesticides classed as slightly toxic (Caution on label) are stored.

b. Pesticides to be used in a single application, even though highly toxic or moderately toxic, can be temporarily stored by user at isolated sites where flooding is unlikely, where provisions are made to present unauthorized entry, and where isolation of buildings is sufficient to prevent contamination by runoff, percolation or wind-blown particles or vapors.

2. Storage Sites

Sites should be selected where flooding is unlikely and where seepage will not contaminate water. If runoff should occur, monitoring should be done and the effluent treated as a pesticide under 165.8 [1].

3. Storage Facilities

Pesticides should be stored in dry, well ventilated, separate room, building or covered over where fire protection is provided. The following precautions should be taken if relevant and practical.

a. Climb-proof fence and locked door and gate to prevent unauthorized entry around facility.

b. Signs placed on fence, building and in room to warn of the hazardous nature of contents.

c. All movable equipment used to handle pesticides should be labeled "contaminated with pesticides" and should not be removed from site unless decontaminated.

d. Provisions for decontaminating persons and equipment, should be provided and provisions for collecting waste water should be provided and treated as excess pesticide.

4. Operational Procedures

Products should be stored with label visible. All containers should be inspected for possible leakage and repaired. Pesticides should be stored according to type, in rooms off the ground and inventoried. Excess pesticides and containers should be segregated according to method of disposal. Storage area should be constantly inspected for leakage and all safety and fire control measures followed.

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[1] 39 FR 15240.

F. Disposal of Pesticide-related Wastes

In general, all pesticide-related wastes shall be disposed as excess pesticides in compliance with 165.7 and 165.8 [1]. These wastes should not be disposed of in an industrial effluent stream.

G. Enforcement of Recommended Procedures for Disposal and Storage

Under 165.2 authorization and scope (c) and (d), the following are direct quotes: [2]

> (c) "The recommended procedures for the disposal of pesticides and pesticide containers apply to all pesticides, pesticide-related wastes (and their containers) including those which are or may, in the future be registered for general use or restricted use, or covered under an experimental use permit, except those single containers discussed in paragraph (e) of this section. These disposal procedures are mandatory only for the Agency in carrying out its pesticide and container disposal operations."
>
> (d) "The recommended procedures and criteria for the storage of pesticides and pesticide containers apply to all pesticides and excess pesticides and to used empty containers and containers which contain pesticides. These procedures and criteria apply to sites and facilities where pesticides that are classed as highly toxic or moderately toxic, and bear the signal words DANGER, POISON, or WARNING, or the skull and crossbones symbol, on the label are stored. Pesticides covered by an experimental use permit should also be stored in accordance with these procedures. These storage procedures are mandatory only for the Agency in carrying out its pesticide and container storage operations. Temporary storage by the user of the quantity of pesticide needed for a single application may be undertaken in isolated areas in accordance with the procedures and criteria given in 165.10(a)."

From the above it is assumed that at the present time, disposal of pesticides and pesticide containers except as described in open burning for single containers or the amount used per day (165.7b), the above is mandatory only for the Agency in carrying out its pesticide and container disposal operations. Temporary storage by the user is excluded in 165.10

H. Economic Impact - Section 19

The economic impacts of Section 19 will affect basic manufacturers, formulators, dealers and distributors, custom applicators and farmers through increased costs associated with prescribed storage and disposal methods for pesticides, pesticide wastes and pesticide containers. Impacts of Section 19, on consumers and industrial users of pesticides are thought to be small in terms of disposal requirements as proposed at the present time.

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[1] 39 FR 15240.
[2] 39 FR 15238.

Storage requirements, as specified, are judged to be consistent with established, sound storage practices and should not result in appreciable additional costs.

The major costs will be those associated with disposal of pesticides, pesticide wastes and pesticide containers.

1. Impacts on Farmers

An analysis of methods of pesticide container disposal methods used by farmers was made by Fox and Delvo in 1971 1/. The summary of disposal methods used is shown in Table 19. As shown from this table, nearly half of all containers were burned, 27 percent (primarily cans) were hauled to a dump with most apparently dumped on farms where used (private dumps). Eleven percent were retained, 6 percent buried, 3 percent returned to the dealer and the balance (3.6 percent) disposed of by other methods.

1972 FIFRA as amended permits open field burning of most combustible pesticide containers (except heavy metal products) in small quantities (approximately one-day's use). Open burning will continue to represent the major disposal used by farmers. However, more herbicides are being produced as emulsions or flowable pesticides in metal containers. In addition, since many fungicides contain heavy metals, these containers can no longer be burned in open fields. As a result, there will be less burning than was indicated by the 1971 study.

It is difficult to estimate the costs to the farmer for pesticide container operations. However, representative costs have been calculated based on the following assumptions per farm unit.

a. 100 acres each of corn, soybeans, cotton or other crops on which pesticides are used.

b. Containers to be disposed include:

   . 40 5-gallon cans
   . 20 1-gallon cans
   . balance paper bags

c. Disposal operations

   . burns paper bags (except heavy metals bags) in field
   . triple rinses, punctures and crushes cans
   . hauls cans to sanitary land fill

1/ Fox, A. S. and A. W. Delvo, "Pesticide Containers Associated with Crop Production," Proceedings of the National Conference on Pesticide Containers, New Orleans, Nov. 28, 1972, published by the Federal Working Group on Pest Management, Washington, D.C.

Table 19. Method of disposal of containers used by farmers

(Percentage distribution of farmer responses to pesticide container questions on container disposal, and collection preferences, United States, 1971.)

Item	Insecticides	Herbicides	Fungicides	All Pesticides
	--------------------Percent--------------------			
Method of Disposal:				
Returned to dealer	1.9	3.1	4.1	3.1
Burned	61.0	45.0	71.4	49.2
Buried	3.7	6.6	7.1	5.8
Private dump	16.7	18.4	2.0	18.9
Commercial dump	7.1	9.6	8.2	8.4
Left in field	1.3	0.7	--	0.9
Left where sprayer filled	0.6	1.5	--	1.1
Retained	6.9	13.3	4.1	11.0
Other	0.8	1.8	3.1	1.6
TOTAL	100.0	100.0	100.0	100.0
Would use collection points:				
Yes	52.3	51.3	46.9	51.6
No	47.7	48.7	53.1	48.4
TOTAL	100.0	100.0	100.0	100.0
	--------------------Number--------------------			
Number of responses	666	1,373	98	2,357

Source: Fox and Delvo (1972)

d. 50 percent of farmers using pesticides, 750,000 will have disposal operations, other 50 percent (750,000) will have pesticides applied by custom applicators who will dispose of containers.

No cost allowance has been made for machine costs (crushing cans with tractor etc.) or for hauling cans to dump. Four hours per year have been allowed for the farmer's time for disposal. Farm labor has been valued at $3.50 per hour. On this basis, the farmers disposal cost would be, 4 hours times $3.50/hr. times 750,000 farmers equals $10,500,000.

2. Impacts on Custom Applicators

Since no specific data are available on disposal costs of custom applicators, it has been necessary to estimate these costs through hypothesizing "representative" situations as follows.

a. Aerial applicators (heavy users of restricted pesticides)

- 4,331 operating units in the U.S., operating 150 days per year
- large, 30-55 gal. drums returned to dealer - no charge
- one hour per day to triple rinse, puncture and crush metal containers; store and dispose of heavy metals containers. Assumes no additional time for burning or hauling containers to dump - normal, existing procedures.
- cost = 4,331 applicators x 150 hours per year x $5.00 per hour = $3,248,250 ($3,250,000).

b. Ground custom applicators

- 80,000 commercial custom applicators
- 40,000 apply 80 days/year - 1/2 hour per day for triple rinse, puncture and crush metal containers and hold and dispose of heavy metals containers (bags and cans) = 40 hours per year x 40,000 x $5.00 per hour = $8,000,000
- 40,000 apply 40 days per year, 1/2 hour per day for disposal operations = 20 hours per year x 40,000 x $5.00 per hour = $4,000,000.

c. Total custom applicator disposal costs

. aerial applicators	$ 3,250,000
. ground applicators	12,000,000
	$15,250,000

3. Impacts on Dealers and Distributors

Destruction of excess pesticides, broken containers etc., estimated 20,000 dealers, $10 per dealer per year = $200,000.

4. Impacts on Formulators

Destruction of sweepings, broken containers and other pesticide wastes, 5,000 locations at $100 per location per year = $500,000.

5. Impacts on Basic Manufacturers

Destruction of sweepings, broken containers, residues from re-use containers, excess pesticides and other related wastes. Based on estimates from manufacturers, $25,000 per firm x 50 firms = $1,250,000. 1/

6. Summary, Economic Impacts, Section 19

Segment	Estimated Disposal Costs
Farmers	$10,500,000
Custom applicators	15,250,000
Dealers and distributors	200,000
Formulators	500,000
Basic manufacturer	1,250,000
TOTAL	$27,700,000

1/ Estimated on the basis of incineration of pesticide wastes at 10 cents per pound incineration cost, plus 2.5 cents per pound transportation, labor and administrative cost. Estimated quantity destroyed = 200,000 pounds per firm per year.

IX. Economic Impact of 24 c - Authority of States

Introduction

Prior to the passage of FIFRA as amended, the States could issue [illegible]te Registration or permit for the use of a pesticide intrastate. This registration was entirely separate from the Federal labeling procedure. These state labels were for uses within the state which were deemed necessary by the State to control a pest. Usually the State labels were for minor uses or minor crops within the State where there was no Federally registered product available.

Section 5(F) states that the Administrator may, under such terms and conditions as he may by regulations prescribe, authorize any State to issue an experimental use permit for a pesticide. Such State Experimental permits would allow applicants for State registrations to accumulate the test data necessary to support State registration and use within the State.

In addition, under 24-C and the provisions of Section 5(F) it may be possible for states to issue experimental permits to allow the field testing of specific pesticides under conditions which might not be as costly as if a Federal experimental permit were required.

Section 24-C will make possible the registration of pesticides for intrastate use to meet special local needs. This provision will be especially useful in providing a means for registering pesticides for minor crop use and will help alleviate the impacts of Section 3 in terms of registration of pesticides for minor uses.

X. Summary - Direct Incremental Costs Associated with the Implementation of Specified Sections of 1972 FIFRA as Amended

Direct costs attributable to those sections of 1972 FIFRA as amended which are expected to have significant economic impacts, are summarized in Table 20. It must be emphasized that the costs shown are estimates since the complexity of the pesticide industry, the complexity of the Act and the manner in which it may be administered make the precise quantification of the economic impacts impossible. However, it is believed that the costs shown are representative of those which may occur, given the assumptions on which they were based.

1. Registration of Pesticides - Section 3

Two costs are shown, "one-time" costs involved with the reregistration of approximately 1,400 active ingredients and "reoccurring" costs representing the costs of initial registration for 10 new active ingredients annually. Costs are based on standard laboratory test charges plus 10 percent contingency to cover costs of pesticides furnished for testing and company administrative costs involved in registration or reregistration procedures. Test costs are only for those new tests required by 1972 FIFRA as amended, including:

a. Teratological studies
b. Oncogenicity studies
c. Chronic feeding studies
d. Reproduction studies
e. Mutagenesis studies
f. Chronic fish residue studies

All six studies are required for new AI. Only the first four are required at present for reregistration of existing AI, but mutagenesis and chronic fish residue studies will be required on all AI within 5 years.

No incremental costs are shown for registration or reregistration of formulations since no additional requirements are imposed provided that the test data for AI in the formulation are on file with EPA.

A major cost associated with 1972 FIFRA registration requirements results from the provision for new label formats for all registered products. This will require the development of new labels and some label inventory loss will occur at the time that the changeover is made. The costs were estimated on the basis of the cost of developing a new label format and the required plates or lithomasters, but do not include costs for the labels themselves. Inventory losses were estimated on the basis of minimum container inventories at the time that new labels are required.

Table 20. Summary, direct incremental costs associated with the implementation of specified sections of 1972 FIFRA as amended

1972 FIFRA Sec.	Description	Estimated Incremental Costs One time ($000)	Estimated Incremental Costs Reoccurring ($000)
3.	Registration of Pesticides	$ 68,525	$ 1,600
4.	Use of Restricted Use Pesticides; Certified Applicators	45,168	28,739
5.	Experimental Use Permits	--	25,000
7.	Registration of Establishments	--	3,534
8.	Books and Records	--	5,120
9.	Inspection of Establishments	--	185
12-G.	Use of Registered Pesticide in a Manner Inconsistent with its Labeling	--	19,200
19.	Disposal and Transportation	--	27,700
	Total Estimated Incremental Cost	$113,693	$111,078

2. Applicator Certification - Section 4

Applicator certification costs were also divided into "one-time" and "reoccurring" costs, Table 17.

The "one-time" costs include the costs of developing training programs and educational materials, costs to applicators for participating in training and for obtaining certification, and costs involved in developing and administering the certification program. Credits were allowed for training and certification fees paid by applicators. Estimates were based on certifying 1,500,000 private applicators (farmers) and 192,000 commercial applicators.

"Reoccurring" costs included the following items:

a. Continued training of applicators (no recertification proposed) based on participation in training programs every second year.

b. Maintaining, updating and revising applicator training programs by the States.

c. Cost to states for monitoring and enforcement.

d. Increased costs to commercial, custom applicators for record keeping and retention.

3. Experimental Permits - Section 5

Incremental costs for experimental permits were based on the increase in the number of experimental permits expected by EPA as a result of the requirement that Federal and State research agencies must now obtain experimental permits for field testing of pesticides. In the past, many companies field tested pesticides through cooperative arrangements with State agricultural experiment stations or cooperative extension services without the need for experimental permits and the testing required to get such a permit.

The incremental costs of Section 5 were based only on the costs associated with those candidate products which are dropped (not registered) as a result of field testing. It was estimated that there would be approximately 250 such products per year. It was also assumed that the incremental costs required for an experimental permit vs. non-permit field testing would be approximately $100,000.

4. Registration of Establishments - Section 7

The principal incremental costs concerned with registration of establishments would be the effort required for developing, maintaining and filing the required annual pesticide reports. Costs were estimated on the basis of clerical time for each product and,managerial review time for each firm.

5. Books and Records - Section 8

The major incremental problem will be that of establishing and maintaining, in usable form, records which will permit the tracing of receipts and shipments by batch number and which will provide an accurate record of all disposal operations. Estimates were made of the clerical costs of maintaining such records, by type and size of firm to get an aggregate incremental cost to industry.

6. Inspection of Establishments - Section 9

The principal costs associated with inspections of establishments were associated with replacement of containers and product where cartons or other containers were opened and samples taken and for escort costs for company personnel to accompany inspectors during their inspection of the plant. These costs were based on 10,000 samples taken and one-day inspection time for large plants and one-half day for small plants.

7. Use Inconsistent with Labeling - Section 12-G

1972 FIFRA as amended makes it illegal to apply any pesticide at rates in excess of label specifications or at less-than-label rates without the written recommendation of a "knowledgeable expert".

Replies were received from 27 State Agricultural Experiment Stations and Extension Services regarding their willingness to make less-than-label recommendations. Over half (14) indicated that, for liability reasons, they would not be willing to make less-than-label recommendations. The others indicated that while they would be willing to make such recommendations, they would do so only under very specific conditions where such recommendations were adequately supported by experimental data.

Illustrations were given by the States of situations where less-than-label application rates would be applicable.

The principal costs which may be associated with Section 12-G would result from cost of pesticide used above that required for effective control and possible crop damage to existing or follow-on crops--especially true with residual herbicides.

It is impossible to predict with accuracy the number and types of situations in which farmers would be unable to obtain recommendations for less-than-label-rate applications, and it is even more difficult to predict crop damage which might result from application at label rates in those situations where lesser rates would be indicated.

No estimate was made of crop damage costs. On the basis of the illustrations provided by the States and on the basis of the reluctance of states to make less-than-label recommendations, the cost of excess pesticide usage could total over $19 million.

8. Pesticides and Pesticide Container Disposal and Storage - Section 19

Regulations for storage and disposal of pesticides and pesticide containers are a new requirement of 1972 FIFRA as amended. Incremental costs vs. present disposal practices, were estimated for farmers, custom applicators, dealers and distributors, formulators and basic manufacturers. Except for basic manufactures, where destruction of pesticides represents a greater problem, costs were estimated based on the man hours of labor required to triple rinse, puncture and crush metal containers and storage and disposal of containers of pesticides having heavy metals contents. No costs were included for burning or for hauling containers to sanitary land fills since it was assumed that these methods of disposal are currently in use.

XI. Economic Impacts of 1972 FIFRA as Amended on Users of Pesticides

Incremental costs associated with implementation of the additional requirements of 1972 FIFRA as amended will result in direct costs to manufacturers, formulators, applicators, farmers, household users, commercial users and government users. These costs will be borne by users either directly or indirectly through higher prices charged for products or services (applicators).

In this analysis, the basic assumption was made that increased costs would be passed forward to users and would be included in marketing margins normally taken by distributors and retailers of pesticides.

A comparison of manufacturer's wholesale price with the retail price paid by farmers for eight major pesticides in 1974 showed a margin of 156 percent between the wholesale and the retail price, Table 21. It is assumed that the margin for household pesticides would be even larger. To allow for differentials due to transportation and other non-pesticide related cost factors, a spread of 1.5 has been assumed.

A summary of those direct incremental costs which may be passed on to users of pesticides is given in Table 22. This summary does not include costs incurred by state agencies since these would not be directly transferred to users. Costs in Table 22 are classified as "one-time" and "reoccurring". "One-time" costs include those incremental costs of reregistering all active ingredients by October 21, 1976 as required by the Act plus the costs of applicator certification which will be borne by farmers and commercial applicators. For the purpose of developing an annualized cost, these "one-time" costs have been amortized over a 10-year period at a 10 percent discount rate. Annual direct or "reoccurring" costs are added to this amortization cost to get total annual cost. As a result of this procedure, the annual costs shown would only apply over the next ten years, after which period the "amortized" component of these costs would be fully amortized.

Except for costs directly assignable to agriculture, other costs were assumed to be borne by users in proportion to their use of pesticides as follows:

Category	Percent of Total Pesticide Use
Agriculture	59.00%
Industry	21.52
Households	16.25
Government	2.91
Unallocated	0.32
Total	100.00%

Table 21. Comparison of wholesale and farmer's price for pesticides, 1974 1/

Name of Pesticide	Wholesale 2/	Retail 3/	Bases
	Per lb./AI		
Aldrin	$1.185	$ 2.020	4 lb/gal/$8.04
Lead Arsenate	.275	.495	per lb.
Malathion	.889	2.140	5 lb/gal/$10.70
Parathion	.515	1.885	4 lb/gal/$7.54
2-4-D	.365	1.470	4 lb/gal/$5.88
2-4-5-T	1.120	3.150	4 lb/gal/$12.60
Toxaphene	.291	.762	6 lb/gal/$4.57
Totals	$4.640	$11.922	

Farm price as % of wholesale price = 256%

Spread (%) = 156% = 1.56 times wholesale price.

1/ Quoted prices as reported by the USDA, may not include discounts or other special pricing arrangements at either the wholesale or retail price level.

2/ The Pesticide Review, 1974, ASCS, USDA, Table 12, p. 14

3/ Agricultural Prices, July 31, 1974, SRS, USDA, Pr 1 (7-74), p. 29.

Table 22. Summary of direct incremental costs of 1972 FIFRA as amended, to manufacturers and formulators, applicators and farmers

Cost Item	Direct Cost One-time	 Reoccurring
Manufacturers registration - new chemicals (Sec. 3)		$ 1,600,500
Reregistration costs, active ingredients (Sec. 3)	$68,525,000	
Experimental permits (Sec. 5)		25,000,000
Registration of establishments (Sec. 7)		3,533,600
Manufacturers and formulators - books & records (Sec. 8)		5,120,400
Inspection of establishments (Sec. 9)		185,100
Manufacturers & formulators disposal costs (Sec. 19)		1,950,000
Applicator certification, retraining & record keeping (Sec. 4)		
Farmers	12,750,000[1]	4,875,000[3]
Commercial applicators	10,560,000[2]	10,864,000[4]
Farmers container disposal costs (Sec. 19)		10,500,000
Commercial applicators disposal costs (Sec. 19)		15,250,000

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[1] Transportation to training ($9,000,000), educational materials ($750,000), and certification ($3,000,000) fees.

[2] Transportation to training ($1,152,000), educational materials ($576,000), transportation to exam ($1,152,000), certification fees ($7,680,000).

[3] Transportation to training ($9,000,000), educational materials ($750,000), total $9,750,000 ÷ 2 since update training assumed every other year.

[4] Transportation to training ($1,152,000), plus educational materials ($576,000) = $1,728,000 ÷ 2 = $864,000 since update training assumed every other year, plus $10,000,000 annually for increased record costs.

A. Agricultural User Costs

1. General Impact

Agriculture uses approximately 59 percent of the total pesticides marketed in the United States. Use of pesticides by type of pesticide and major crop, in 1971 is shown in Table 23. Table 23 shows clearly that corn is the biggest single user of active ingredients with cotton a close second. Herbicides account for 80 percent of all pesticides used on corn and 65 percent is accounted for by three products, atrazine, propachlor and 2-4-D in that order. [1]

With cotton, however, insecticides are most used, accounting for 85 percent of the active ingredients. Toxaphene, methyl parathion and DDT (1971) made up 87.5 percent of all insecticides used on cotton.[1] The banning of DDT since that time, will of course change this distribution.

Fruits and nuts as a group are the next largest users of active ingredients followed by soybeans, grain crops and vegetables. The use of pesticides in livestock production is substantial and ranks high among the farm uses of pest control chemicals.

Cotton, peanuts, fruits, nuts and vegetables used large quantities of sulfur in different forms. The total volume of sulfur and petroleum solvents was 335 million pounds or 40 percent of the total volume shown in Table III-5. This table does not show dry diluents such as fine clays but Table III-4 shows 557 million pounds used in all sectors.

Some crops such as tobacco need special chemicals such as maleic hydrazide for "sucker" growth control and the use of fumigants such as D-D mixture and Telone. The nature of the crop is such that these minor use chemicals play an important role in the successful production of a widely used crop.

With regard to minor chemicals and minor uses, there is not enough data available on which pesticides and formulations will become unavailable or severely restricted through the enforcement of these new regulations to allow an impact evaluation other than in general terms based on assumptions. This problem is discussed further later in this report.

The estimated annual direct economic impact to agricultural pesticide users resulting from the incremental requirements of 1972 FIFRA as amended, is shown in Table 24. As illustrated in this table, costs to agriculture result from three major sources:

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[1] Farmers' Use of Pesticides in 1971, ERS, USDA, Agr. Economic Report 252, p. 11

[2] _Op. cit._, p. 14.

Table 23. 1971 Pesticide use by crops in the United States (lbs X 1,000 active ingredients)

Crop	All Pesticides + S & Petrol	Fungi-cides	Herbicides	Insecti-cides	All Other Types	Miti-cides	Fumigants	Defoli-& Desic-cants	Rodenti-cides	Repell-ents	Sulfur	Petrol Products
	----------	----------	----------	---000 lbs.	- active	ingredients	----------	----------	----------	----------	----------	----------
Corn	139,992	—	101,060	25,531	444	57	386	<0.5	<0.5	—	—	12,957
Cotton	127,090	300	19,610	73,357	18,696	282	1,164	17,250	—	—	15,078	49
Citrus & apples	164,778	16,464	873	7,880	1,828	1,123	515	8	7	175	25,595	112,138
Hay (all forages)	44,294	—	8,963	2,609	1/	1/	1/	—	—	—	—	32,722
Peanuts	40,764	4,431	4,374	5,993	1/	1/	1/	—	—	—	25,966	—
Potatoes (Irish)	13,298	4,124	2,178	2,770	2/	2/	2/	—	—	—	2/	4,226
Rice	7,985	—	7,985	3/	1/	1/	1/	—	—	—	—	—
Sorghums	11,555	—	11,538	3/	1/	1/	1/	—	—	—	—	17
Soybeans	42,341	—	36,519	5,621	1/	1/	1/	1/	—	—	—	201
Sugarbeets	2,990	—	2,977	1/	1/	1/	1/	—	—	—	—	13
Tobacco	14,461	—	897	4,000	9,420	—	4,429	—	—	4,991	1/	144
Wheat & S. fallow	15,619	—	13,059	1,712	1/	—	1/	—	—	—	—	848
Other grains	12,932	—	5,377	7,496	1/	—	1/	—	—	—	—	59
Other vegetables	39,868	5,656	3,361	8,268	10,435	42	9,959	339	—	95	5,261	6,877
Other fruits & nuts	80,390	6,918	1,503	6,274	1,772	397	1,073	—	1	301	31,390	32,533
Other field crops	14,590	1,732	6,053	2,279	3,335	88	3,124	121	1	0.5	803	388
(Seeds & transplants (Nursery & greenhouse	1,403	—	230	467	344	32	309	—	1	2	—	362
Livestock (all)	29,351	514	—	14,784	569	—	136	—	4	429	358	13,126
Other farm uses	16,036	1,578	1,399	729	7,863	—	—	—	—	—	7,462	4,868
Total	828,090x	41,727	227,906	169,770	54,706	2,021	21,095	17,718	15	5,994	112,093	221,528

x Active ingredients (excluding sulfur and petroleum) = 494,109.

1/ See Other Field Crops.

2/ See Other Vegetables.

3/ See Other Grains.

Source: Pesticide Review and AE Report 252: Farmers' Use of Pesticides in 1971.

a. Increased costs of pesticides represented by pass through of costs by manufacturers, formulators, distributors and retailers.

b. Direct costs to farmers resulting from applicator training and certification costs for both private applicators (farmers) and commercial applicators.

c. Direct costs to farmers resulting from container disposal costs incurred by farmers and custom (commercial) applicators.

On an annualized cost, over the next ten years, the incremental costs to agriculture, from these three sources, resulting solely from the requirements of 1972 FIFRA as amended, total $105.5 million.

In addition to this cost, there is the possibility of a substantial cost impact from Section 12-G which requires farmers to apply pesticides at rates recommended on the label unless they have a written recommendation from a "knowledgeable expert" for a less-than-label rate application. The primary source of such recommendations would be state agricultural extension services or agricultural experiment stations. Out of 27 states responding to a letter regarding such recommendations, 14 indicated that they would not make such recommendations and the remainder would do so only with specific qualifications. If half of the farmers are unable to get less-than-label recommendations then the cost to farmers, from excess pesticides used (above amounts required for effective control) could amount to $19,200,000 per year without any allowance for damage to growing crops or residual damage to follow-on crops.

2. Impact by Regions

Economic impacts, by agricultural region, due to incremental requirements of 1972 FIFRA as amended are shown in Table 25. In terms of total costs, the greatest impacts are found in the Corn Belt, Southeast, Delta, and Pacific States. These states have large acreage of crops which are intensive users of pesticides - corn, cotton, soybeans and fruits and vegetables. On a cost-per-crop-acre basis, the greatest impacts were seen in the Southeast ($1.41), Delta ($.85) and Pacific ($.60) states where cotton combined with fruits and vegetables result in high levels of pesticide use. Lowest levels of impact were found in the Mountain ($.09) and Northern Plains Regions ($.10) where small grains such as wheat are dominant and pesticides are less important.

Table 24. Estimated cost impact on agricultural pesticide users of incremental requirements of 1972 FIFRA as amended, assuming complete pass-through of costs.

Cost Item	Data Source	Calculations		Estimated annual cost
1. Manufacturers and formulators pass-through of				
a. Annual incremental costs	Table 22	$37,389,000 x .59 =	$22,059,864	
b. One-time reregistration costs	Table 22	$68,525,000 x .59 at 10%, 10 yrs =	6,579,756	
c. Total				$28,639,620
2. Wholesaler-retailer price spread on Item 1	Table 21	$28,639,620 x 1.5 =		42,959,430
3. Direct costs to farmers				
a. Applicator certification, retraining and records (farmers & commercial applicators)				
(1) Annual cost				
(a) Farmers (private applicators)	Table 22	$4,875,000		
(b) Commercial applicators	Table 22	$10,864,000 x .59 = 6,409,760		
(2) Initial certification cost				
(a) Farmers (private applicators)	Table 22	$12,750,000		
(b) Commercial applicators	Table 22	$10,560,000 x .59 = 6,230,400		
(3) Total applicator cost		$18,980,400 at 10%, 10 yrs = 3,088,973		14,373,733
b. Disposal				
(1) Farmers	Table 22	$10,500,000		
(2) Commercial applicators	Table 22	15,250,000 x .59 = 8,997,500		
(3) Total				19,497,500
4. Total annual costs to agriculture 1/				$105,470,283

1/ In addition, further costs, estimated at $19,200,000 per year could possibly result from excess pesticide usage (Section 12-G) in situations where less-than-label rates would give adequate control and where farmers do not get permissive recommendations.

Table 25. Estimated incremental cost, 1972 FIFRA as amended to agriculture, by regions.

Region	Est. total acres of cropland[1]	Total pesticide use, 1971 (lb. AI)[2]	Estimated incremental 1972 FIFRA costs to agriculture	Incremental cost per acre of total cropland
	(000 acres)	(million lbs)	($000)	($)
Pacific	19,049	50.1	$11,349	$0.60
Mountain	34,850	14.0	3,171	0.09
N. Plains	88,313	37.7	8,541	0.10
S. Plains	33,907	41.7	9,437	0.28
Lake States	31,507	35.4	7,952	0.25
Corn Belt	70,718	100.6	22,800	0.32
Delta States	15,933	60.1	13,616	0.85
Appalachians	14,758	33.5	7,689	0.51
Southeast	11,539	71.9	16,280	1.41
Northeast	12,204	20.9	4,735	0.39
U.S. Total	332,789	465.9	106,47[illegible]	0.32

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[1] Source: Agricultural Statistics, 1972, USDA.

[2] Source: Farmers Use of Pesticides in 1971, ERS, USDA, Agr. Econ. Report No. 252.

B. Industrial User Costs

Estimated incremental costs, resulting from provisions of 1972 FIFRA as amended, to industrial users of pesticides are shown in Table 26. Incremental costs to industrial users result from the pass-through of increased costs of manufacturers, formulators, and applicators arising from the additional requirements of 1972 FIFRA as amended. It is estimated that industrial users consume 21.5 percent of the total volume of pesticides sold in the United States. On this basis costs to industrial users, resulting from the incremental requirements of 1972 FIFRA as amended, would approximate 32.0 million per year during the ten years beginning October 21, 1976. As shown in Table 26, these costs result from the following:

1.	Pass-through costs from manufacturers and formulators	$10,446,051
2.	Wholesaler-retailer price spread	15,669,076
3.	Applicator certification, retraining and records costs	2,707,774
4.	Disposal costs, commercial applicators	3,281,800
5.	Total	$32,104,701

C. Household User Costs

Estimated annual costs to household users of pesticides, resulting from the incremental requirements of 1972 FIFRA as amended, are shown in Table 27.

It is estimated that household users of pesticides consume 16.25 percent of all pesticides used in the United States. On this basis, total incremental costs to household users is estimated at $24.2 million. The major part of this cost ($19.7 million) results from pass-through of increased costs to manufacturers and formulators plus wholesale-retail price spreads for these products. Increased costs to commercial applicators resulting from certification, retraining, records keeping and disposal of containers account for the balance of the cost.

D. Governmental User Costs

Use of pesticides by governmental installations and agencies (e.g., Forest Service, Bureau of Land Management, Defense Department, etc.) is estimated to consume approximately 2.9 percent of all pesticides used in the United States. Costs to governmental users of pesticides resulting from the incremental requirements of 1972 FIFRA as amended are estimated at $3.6 million annually for the 1976-1985 period (Table 28). Again, the major

Table 26. Estimated cost impact on industrial pesticide users of incremental requirements of 1972 FIFRA as amended.

Cost item	Data Source	Calculations		Estimated annual cost
1. Manufacturers and formulators pass-through of				
a. Annual incremental costs	Table 22	$37,389,000 x .2152 =	$8,046,113	
b. One-time reregistration costs	Table 22	$68,525,000 x .2152 at 10%, 10 yrs =	2,399,938	
c. Total				$10,446,051
2. Wholesaler-retailer price spread on Item 1	Table 21	1.5 x $10,446,051		15,669,076
3. Applicator certification, retraining, and records cost				
a. Annual cost-commercial applicators only	Table 22	$10,864,000 x .2152 =	2,337,933	
b. Initial certification cost-commercial applicators only	Table 22	$10,560,000 x .2152 at 10%, 10 yrs =	369,841	
c. Total applicator cost				2,707,774
4. Disposal costs - commercial applicators	Table 22	$15,250,000 X .2152		3,281,800
5. Total annual costs to industrial users				$32,104,701

Table 27. Estimated cost impact on household and institutional users of pesticides, of incremental requirements of 1972 FIFRA as amended

Cost Item	Data Source	Calculations		Estimated annual cost
1. Manufacturers and formulators pass-through of				
a. Annual incremental costs	Table 22	$37,389,000 x .1625 =	$6,075,712	
b. One-time reregistration costs	Table 22	$68,525,000 x .1625 at 10%, 10 yrs =	1,812,221	
c. Total				$ 7,887,933
2. Wholesaler-retailer price spread on Item 1	Table 21	1.5 x $7,887,933		11,831,899
3. Applicator certification, retraining and records costs				
a. Annual cost-commercial applicators only	Table 22	$10,864,000 x .1625 =	1,765,400	
b. Initial certification cost - commercial applicators only	Table 22	$10,560,000 x .1625 at 10%, 10 yrs =	279,271	
c. Total applicator cost				2,044,671
4. Disposal costs, commercial applicators	Table 22	$15,250,060 x .1625		2,478,125
5. Total annual costs to households				$24,242,628

Table 28. Estimated cost impact on governmental pesticide users of incremental requirements of 1972 FIFRA as amended.

Cost Item	Data Source	Calculations		Estimated annual cost
1. Manufacturers and formulators pass-through of				
a. Annual incremental costs	Table 22	$37,389,000 x .0291 =	$1,088,020	
b. One-time reregistration costs	Table 22	$68,525,000 x .0291 @ 10%, 10 yrs =	324,527	
c. Total				$1,412,547
2. Wholesaler-retailer price spread on Item 1	Table 21 1/	1.0 x 1,412,547		1,412,547
3. Applicator certification, retraining, disposal and records cost				
a. Annual cost - commercial applicators only	Table 22	$10,864,000 x .0291 =	316,142	
b. Initial certification cost - commercial applicators only	Table 22	$10,560,000 x .0291 @ 10%, 10 yrs =	50,011	
c. Total applicator cost				366,153
4 Disposal costs, commercial applicators	Table 22	$15,250,000 x .0291		443,775
5. Total annual costs to governmental users				$3,635,022

1/ The "normal" price spread of 1.5 has been reduced to 1.0 reflecting more favorable purchase terms on government contracts.

part of these costs $2.8 million results from pass-through of manufacturers', formulators' and distributors costs. In calculating the wholesale-retail price spread on government purchases, a lower price spread (1.0) was used on the assumption that government purchases would be on more favorable terms than normal retail purchases by farmers, industry or households. The balance of the costs to government $0.8 million would be related to applicator costs for certification, retraining, records and disposal. It is recognized that in many instances governmental application of pesticides would be made by governmental employees. However, it is assumed that such employees would be subject to certification requirements and other regulations to the same degree as private and commercial applicators.

E. Summary - Economic Impacts on User Groups

Based on the assumption that manufacturers, formulators, distributors and commercial applicators will pass-through all costs associated with incremental requirements of 1972 FIFRA as amended and that these costs will be proportionate to consumption by user groups, and further that direct costs to farmers, resulting from incremental requirements of 1972 FIFRA as amended, are as indicated, the incremental costs resulting from 1972 FIFRA as amended are as follows:

User Group	Incremental Cost - 1972 FIFRA (millions)
Agriculture	$105.5
Industry	32.1
Households	24.2
Government	3.6
Total	$165.4

These are direct costs only. Other possible costs which have not been estimated would include:

1. Section 12-G costs (Use Inconsistent with Labels) which may result from situations where excess quantities of pesticides are applied because label rates are greater than required for effective control and users could not or did not obtain written recommendations from "knowledgeable experts" which would permit them to use less-than-label rates. Such costs would result from costs of excess pesticide used and from possible damage to growing or follow-on crops, especially in the case of herbicides.

2. Use of less-effective pesticides to avoid problems involved with the use of restricted pesticides. Costs could result from less effective control, use of more expensive substitute pesticides where heavier doses or more frequent applications are required.

3. Losses resulting from non-use of pesticides due to lack of good substitutes for restricted materials and reluctance to incur costs of application of restricted pesticides by certified applicators.

XII. Economic Impacts on Consumers of Final Products Resulting From Incremental Requirements of 1972 FIFRA as Amended

Pesticides constitute an important input to the production and storage of many products which are important to the consumer and to the maintainance of high standards of living in the United States.

This chapter will examine those economic impacts resulting from implementation of 1972 FIFRA as amended which are derived from the role of pesticides as one of a group of technical production inputs. It does not consider the impacts on consumers as direct users of pesticides in applications in the home or on lawns or gardens. These were considered in Section X of this report.

A. Role of Pesticides in Food and Fiber Production

Pesticides have become increasingly important in the production of food and fiber crops in the United States. Insecticides, herbicides, fungicides and similar materials contribute to modern agricultural production in the following ways:

- reduce costs of production
- increase yields
- improve crop quality
- permit more timely cultural practices
- reduce losses in livestock production

Although these contributions are important to the efficient production of U.S. food and fiber crops and are an important factor in maintaining an abundant and relatively low-cost supply of food and fiber for the U.S. consumer, it is recognized that the increased utilization of chemical pesticides poses hazards to humans, animals, birds, aquatic life and to the environment in general.

It has been estimated, in Part II of this report, that the direct annual costs to agriculture for the next 10 years from the implementation of Section 3, 1972 FIFRA as amended, would be approximately $105,470,000 if all additional (incremental) costs are passed forward to agricultural users. As of the present time, this appears to be the most logical assumption on which to base an estimate of the economic impact of the incremental requirements of 1972 FIFRA as amended.

1. Relative importance of cost of pesticidal materials as related to total costs of production and harvesting - selected crops

The relative importance of pesticides (insecticides, herbicides and fungicides) as a part of the total costs of production and harvesting varies substantially among crops, from as much as 20 percent for such crops as cotton to as little as one percent for alfalfa hay. Some crops use no pesticides.

For those crops where pesticides represent an important production input, any appreciable increase in the cost of these materials, resulting from pass-through of increased registration costs by manufacturers, would be a factor influencing the profitability of these crops to farmers and would influence levels of production in three ways:

- By shifts to other "more profitable" crops
- By reduced use of pesticides resulting in lower yields
- Shift to alternative pest management programs which could maintain yields, e.g. integrated pest management programs.

Prices of most farm products have not been directly related to costs-of-production, but are more directly related to marketable supplies of these products. Thus, the price impact on consumers would be indirect, through supply impacts, but in the long-run would, nevertheless, be real.

Table 29 shows that relative cost of pesticides as a part of the total costs of production and harvesting for selected crops.

Major crops for which pesticides represent an important part (over 10 percent) of total farm costs include cotton, corn, soybeans, rice, tree fruits (apples, oranges, pears), field peas, peanuts and asparagus. Among this group are three of the most important field crops produced in the United States, soybeans, corn and cotton. In 1973, cash receipts from these three crops totaled $25 billion or 59.1 percent of total cash receipts from all crops. Adding receipts from the other crops shown under I in Table 29. brings the total to $28.6 billion or 67.6 percent of total cash receipts from crops.

Crops where pesticides represent a moderate part of total production cost (5 to 9 percent) are shown in category II, Table 29. Major crops include tobacco (cash receipts $1.6 billion), potatoes ($1.2 billion) and sugar beets ($0.44 billion).

Crops where pesticide costs are relatively small (less than 5 percent include the major small grains -- wheat (1973 value $6.5 billion), barley ($0.85 billion) and rye ($0.05 billion), hay and other miscellaneous crops.

Table 29. Percentage of total variable production and harvesting costs accounted for by pesticide materials, representative crops

Category and crop	Percent of total variable cost represented by pesticide materials1/ (%)
I. Crops where pesticide costs are a large part of total costs	
Cotton	20
Peanuts	20
Field peas	20
Soybeans	19
Asparagus	19
Pears	15
Corn	11
Rice	11
Apples	10
Oranges	10
II. Crops where pesticide costs are a moderate part of total costs	
Cucumbers	8
Alfalfa seed	7
Carrots	7
Flax	7
Tobacco	6
Sugar beets	6
Cherries	5
Potatoes	5
Dry beans	5
Bell peppers	5
III. Crops where pesticide costs are a small part of total costs	
Grapes	3
Wheat	3
Rye	3
Onions	3
Barley	2
Alfalfa hay	1

Source: Primary source "Selected U.S. Crop Budgets," Economic Research Service, U.S. Department of Agriculture, 1971 plus cost-of-production studies from selected State Agricultural Experiment Stations.

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[1] Percent of total variable production costs, including purchased inputs, labor, power and equipment, and interest on operating capital.

B. Price Relationships, Prices Paid by Farmers, Farm Prices and Consumer Food Prices

Although the relationship between farm costs and consumer prices is indirect (through the supply function) and operates only over long-run periods, it is nevertheless real. Table 30 and Exhibit 4 show the relationships between indexes of consumer prices for all foods, prices paid by farmers for production items, wholesale farm prices and wholesale prices for all commodities. As seen in Exhibit 4, these indexes followed similar patterns 1964-1972 when farm prices began to advance at a more rapid rate. This spurt in farm price levels was occasioned in part by a substantial expansion in export demand, particularly the massive sales of wheat and corn to USSR and to the Peoples Republic of China.

Exhibit 5 shows the relationships in percentage changes in indexes of consumer prices for all foods and prices paid by farmers for production items. The relative changes were reasonably consistent 1965-1971. In 1972-73 the situation was influenced by Phase II and Phase III wage and price controls which resulted in departures from relationships which had existed.

Although the relationship between prices paid by farmers for production and consumer food prices is influenced by a wide number of factors, a reasonably consistent relationship appears to exist and the influence of Section 3, 1972 FIFRA as amended, insofar as it results in increased pesticide costs to farmers, would in the long-run tend to put upward pressures on consumer food prices.

C. Estimated Quantitative Impact of Section 3, 1972 FIFRA as Amended, on the Consumer

The food industry in the United States, from basic agricultural production to retailing, is competitive. Profits are relatively low as compared with many other industries and for this analysis it is assumed that increased costs are ultimately passed forward to the consumer as higher food prices. This may not be a direct pass through of costs but will in many cases be reflected in lower supplies as producers shift out of less profitable enterprises. It is further assumed that as these costs are passed forward, processors, wholesalers and retailers maintain their margins and mark-ups on the higher cost base.

Table 31 shows the relationships between cash receipts from farming, total production costs and costs of pesticides used in crop production.

Table 30. Wholesale and consumer price indexes, 1959-1974

Year	Price index - 1967 = 100			
	Wholesale farm products	Wholesale all foods	Consumer price index - foods	Prices paid by farmers for production items
1959	97.5	90.7	87.1	93
1960	97.2	92.1	88.0	92
1961	96.3	92.1	89.1	93
1962	98.0	92.6	89.9	94
1963	96.0	92.4	91.2	95
1964	94.6	92.8	92.4	94
1965	98.6	96.2	94.4	96
1966	105.9	101.9	99.1	99
1967	100.0	100.0	100.0	100
1968	102.5	103.4	103.6	102
1969	108.8	109.6	108.9	106
1970	111.0	113.5	114.9	110
1971	112.9	115.5	118.4	115
1972	125.0	121.8	123.5	122
1973	176.3	146.4	134.5	146
1974	183.7	166.9	161.7	169

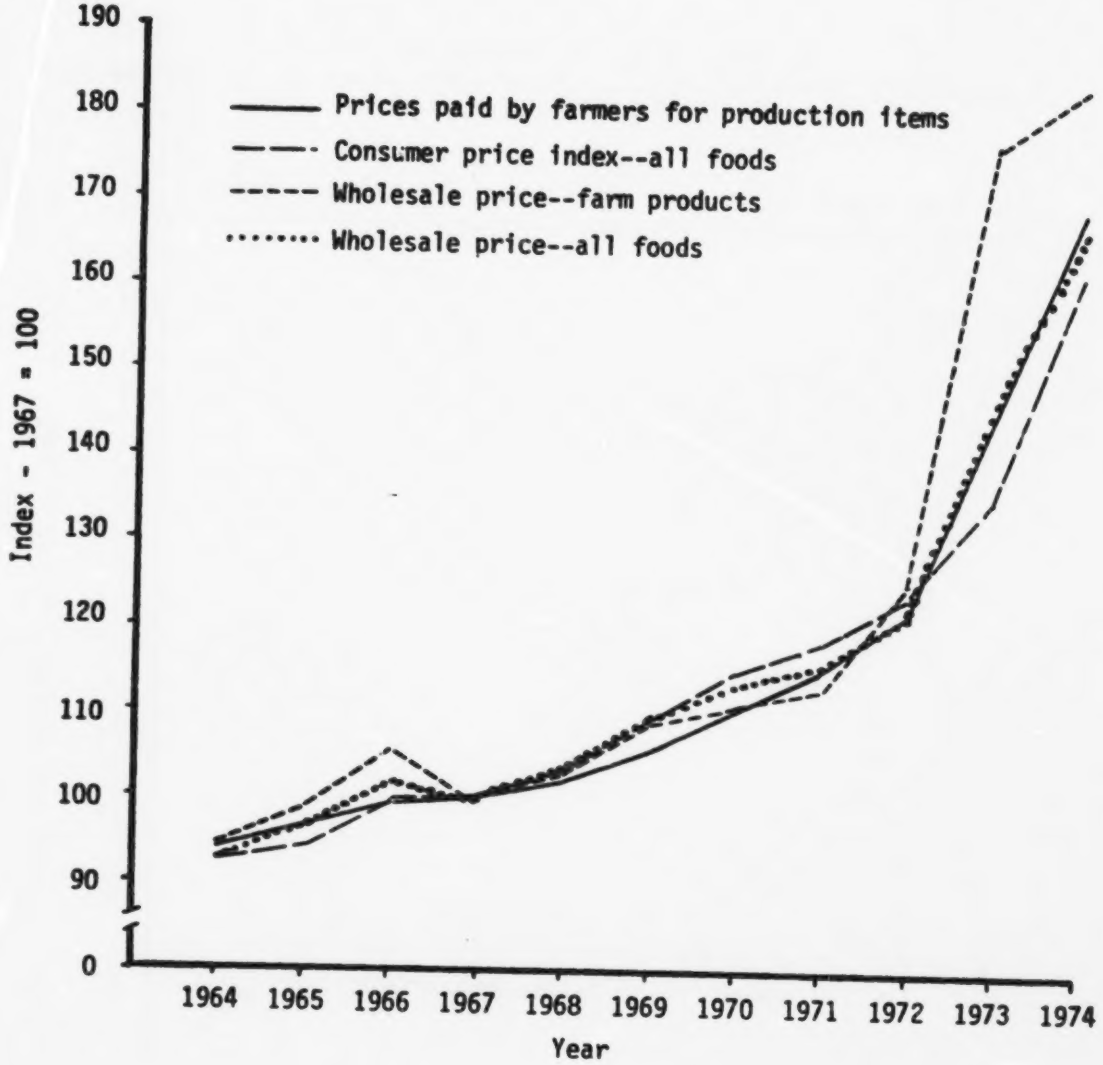

Exhibit 4. Price indexes, farm and food.

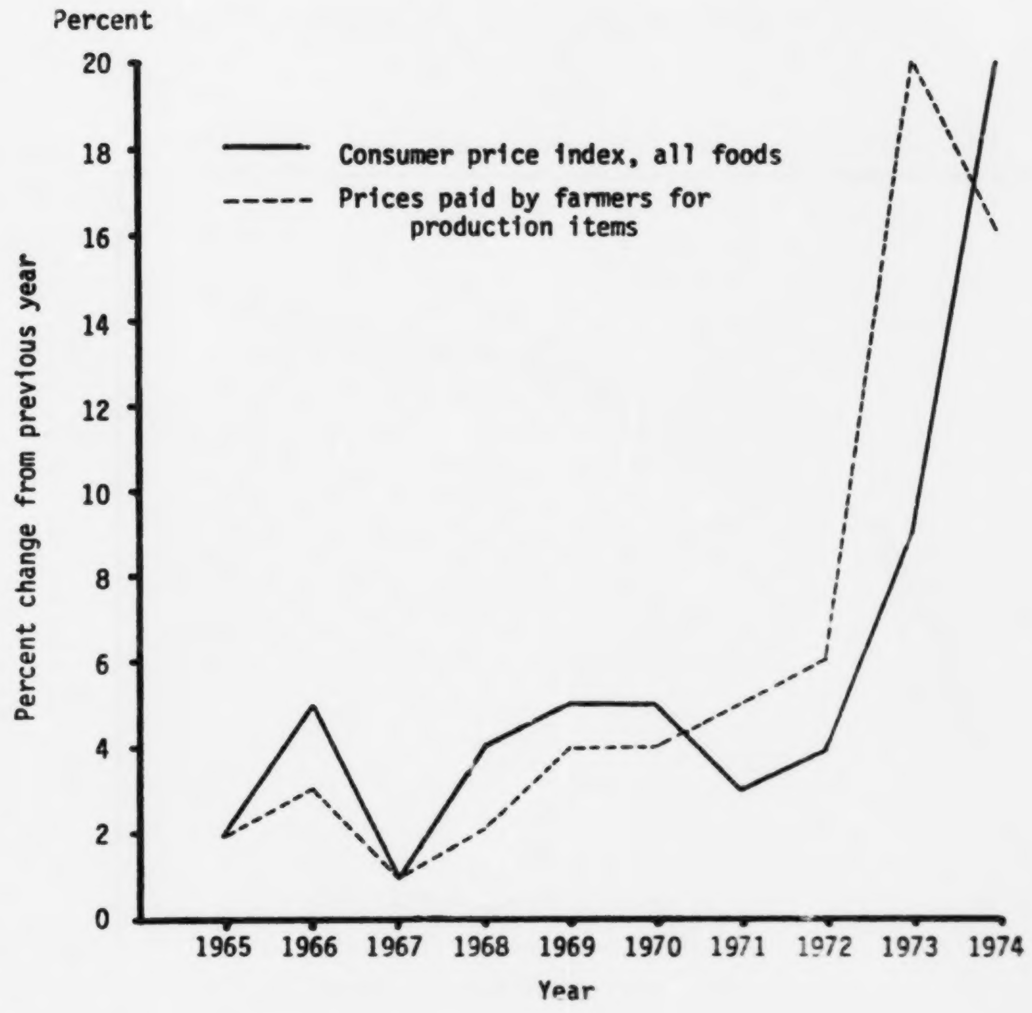

Exhibit 5. Changes in indexes of consumer prices for all foods and prices paid by farmers for production items, 1965-74.

Table 31. Cash receipts, estimated total variable production costs and pesticide costs, U.S. crop production, 1973 1/

Crop	1973 Cash receipts ($ million)	Est. total variable production & harvest costs ($ million)	% pest. costs (%)	Estimated pesticide costs ($ million)
Oil seeds	$ 8,742	$ 6,556	19	$1,246
Feed grains	9,419	7,064	10	706
Cotton	2,509	1,882	20	376
Fruits & nuts	3,101	2,326	10	233
Vegetables & melons	4,175	3,131	6	188
Food grains	6,228	4,671	3	140
Tobacco	1,592	1,194	6	72
Other	2,406	1,805	8	144
Total	$38,172	$28,629	-	$3,104

1/ Source: Agricultural Statistics 1974, USDA, and "Selected U.S. Crop Budgets" ERS, USDA.

It is estimated that 85 percent of agricultural pesticides are used on crops. Therefore, total agricultural value of pesticides in 1973 = $3,104,000,000 (crops) ÷ .85 = $3,652,000,000. This compares with an estimated 1973 value of agricultural pesticides of $3,707,000,000 derived by expanding value of production of synthetic organic pesticides as reported by the U.S. International Trade Commission, by the manufacturer-retail spread of 1.5.

It was estimated that the total annual cost to agriculture which could result from the implementation of incremental requirements, 1972 FIFRA as amended, would be in the order of magnitude of $105,470,000. This would represent a 2.9 percent increase in the cost of pesticides to the farmer, or an increase in total variable crop production costs of approximately 0.37 percent.

The farmer's share of the consumer's food dollar, as reported by the USDA in the Marketing and Transportation Situation, was approximately 42.5 percent in 1974 and 45.6 percent in 1973. It is recognized that a substantial part of this farm-retail price spread consists of costs such as transportation, labor, packaging, etc., not specifically related to the farm value of the foods produced. However, another part, the wholesale and retail "mark-up" is directly related to the cost of the product to the wholesaler and retailer.

Assuming that the incremental costs to the farmer of 1972 FIFRA as amended are passed forward through the marketing system, that fresh packers and processors profits are maintained and that gross margins of wholesalers and retailers are maintained, then the impact on consumer food prices of a $105,470,000 incremental cost to agriculture would be approximately as follows:

1.	Incremental cost to agriculture	$105,470,000
2.	Plus packers and processors' profits on sales of 3 percent [1]	3,164,100
3.	Cost to wholesalers	$108,634,100
4.	Plus wholesalers' margins on sales of 5 percent[2]	5,431,705
5.	Cost to retailers	$114,065,805
6.	Plus retailers margins on sales of 20 percent[2]	22,813,161
7.	Equals total incremental cost to consumer associated with Section 3, 1972 FIFRA as amended	$136,878,966

This is a simplified analysis and does not consider those marketing costs such as transportation, etc. which would not be impacted by 1972 FIFRA.

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[1] Source: Financial data obtained from food processors, DPRA files.

[2] Developments in Marketing Spreads for Agricultural Products in 1973, ERS, USDA, Report No. ERS - 14 (1974)
page 12, Table 2 shows wholesale margin ranging from less than 1 percent with most values in the 3-9 percent range.
page 13, "Retail store margins for the 19 items ranged between 10 and 43 percent of the retail selling price, but are clustered around 20 percent." Since the margin used here in based on wholesale price, it may be low.

Consumer expenditures for food consumed in the home were estimated at $112.8 billion in 1973 and $130.4 billion in 1974. On this basis, the additional cost to the consumer resulting from the incremental requirements of 1972 FIFRA would be only 0.1 percent of the national food bill. Although this cost is small in percentage terms, it is large ($136.9 million) in absolute terms. In addition, it must be recognized that this is only the impact on the consumer's food budget. To this $136.9 million must be added the non-food, direct impacts on household use of pesticides ($24.2 million) plus a part of the added costs to commerce and industry which would be passed forward as higher consumer prices. Finally, the consumer, as the ultimate taxpayer would bear most of the costs associated with the impact on governmental uses of pesticides (estimated at $3.6 million).

Thus, the impacts on the consumer, both direct and indirect, resulting from incremental requirements of 1972 FIFRA as amended could total $165 million dollars annually for the next ten years.

XIII. Inflationary, Energy, Employment and Summary Impacts of Incremental Requirements of 1972 FIFRA as Amended

There is no formula by which the specific impacts of incremental requirements of 1972 FIFRA as amended on inflation, energy, employment and society in general can be measured. 1972 FIFRA as amended is only one of a myriad of factors bearing on these sectors of our national economy.

Although the quantitative measurement of these impacts is complex, the direction and general severity of the impacts can be identified.

A. Inflationary Impacts

The estimated cost impacts of incremental requirements of 1972 FIFRA as amended on manufacturers, formulators, users and the consumer were discussed in Sections I-XI of Part II of this report. It was assumed that, in the long-run, these costs would be passed on to direct users and that most of this incremental cost would eventually reach the consumer.

Given the assumptions made, the estimated annual cost impacts 1976-1985 on direct users would be:

		(millions)
*	Agriculture	$105.5
*	Commerce and industry	32.1
*	Households	24.2
*	Government users	3.6
*	Total	$165.4

Although a part of these direct user costs may be absorbed by agriculture and commerce and industry, most costs would ultimately reach the consumer. It is estimated that the cost to the consumer resulting from higher food prices would be in the order of magnitude of $136.9 million and adding to that household direct user costs of $24.2 million, government costs of $3.6 million and a part of the costs to commerce and industry users could easily bring the annual cost to the consumer to $165 million for the next ten years.

B. Energy Impacts

Pesticides are derived from both natural (e.g. pyrethrum) and synthetic sources. Many of the most effective pesticides, whether herbicides or insecticides, are synthesized from petroleum and pesticides and are produced from such products as benzene, naptha and toluene. The organochlorines, organophosphorus, carbamates, phenoxys, phenylureas and benzoics are petroleum-based chemicals. Ninety percent of all organic chemicals are petroleum-based. However, the actual quantities of petroleum used in their manufacture is small when compared to other uses of petroleum products in the United States.

The shortage of pesticides (especially herbicides) which occurred in 1974 was not so much a function of the petroleum shortage but was the result of substantial expansion in demand by farmers coupled with limits to production capacity of manufacturers. However, if pesticide consumption is to be maintained, or to continue to expand, continued availability depends on the profitability of this industry and its ability to compete for petroleum products. Thus, the need for energy remains critical.

The rapid expansion in the use of pesticides has been the result of technical, biologic and economic conditions. Apparent increases in insect infestations have required increasing control efforts as have apparent increases in insect resistance to pesticides over time. The effectiveness of modern herbicides together with increasing labor and fuel costs have increased farmers' interest in chemical weed control and technical improvements in both aerial and ground application equipment have facilitated the use of pesticides.

By using pesticides, especially herbicides, farmers have made reductions in use of fuel in tillage and other cultural practices. In this sense, if petroleum conservation measures continue to be emphasized, tillage should be minimized and herbicide use could increase.

If pesticide availability is restricted or if farmers are forced to use less effective pesticidal materials as a result of the impacts of 1972 FIFRA as amended, then more farmers will have to resort to mechanical tillage and other mechanical or biological means. No comprehensive study of the trade offs between chemical and non-chemical control of pests has been completed. However, a recent study by the National Academy of Sciences 1/ concluded "The majority of modern cropping systems returned several calories of digestible energy per calorie of total cultural energy; that is, most of the technologically advanced systems that were studied generated far more digestible energy than was spent in energy during production.

C. Impacts on Productivity

American agriculture is the most productive in the world and productivity of the American farmer has been increasing at a rapid rate over the past 25 years. Exhibit 6 shows the number of people supplied per farmer in the United States, 1950-1975.

1/ Agricultural Production Efficiencies, National Academy of Sciences, 1975.

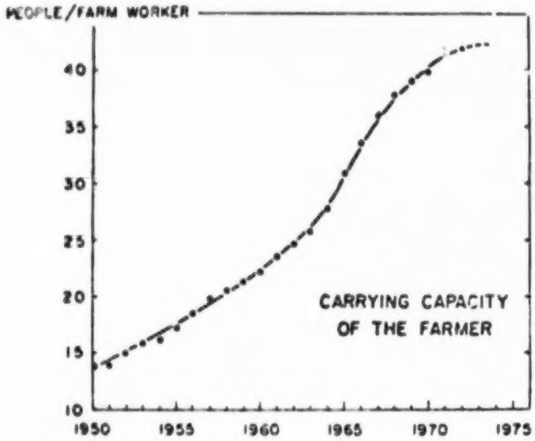

Exhibit 6. People supplied farm products per U.S. farmer, 1950-1975.

Although the carrying capacity (productivity) of the U.S. farmer has more than tripled in the past 25 years, there are signs that this trend is leveling off. Food production rests on two bases, land and the farmer and the interaction of these two primary factors of production is conditioned by capital requirements, new technologies, and regulatory action programs. A major factor affecting the productivity of agriculture in the next decade will be available technology based on research and public policy that encourages rather than constrains its adoption.

D. Impacts on Employment

If the requirements of 1972 FIFRA as amended result in a substantial "fall-out" of pesticides, then those small pesticide formulators who are dependent on these products will be forced out of business.

It is not anticipated that basic manufacturers of AI would face closure decisions. The major burden would fall on formulators. Without a detailed study of financial costs and returns of pesticide formulators before and after Section 3, 1972 FIFRA, there is no real basis for estimating the number of firms which might face possible closure. These firms will vary from small operations with annual gross sales of less than $500,000 to major multi-million dollar operations. Information from 33 formulators, developed during this study, indicated average annual gross sales of $2,750,000 per firm. Sales ranged from a low of $200,000 to a high of $18,000,000.

Discussions with formulators indicated that a large proportion of the smaller formulators were pessimistic regarding their ability to survive if faced by their interpretation of full implementation of 1972 FIFRA as amended requirements.

Confidential data from 33 formulators, developed through personal contacts in this study, indicated average employment per firm to be 45. Distribution of these firms according to number of employees was as follows:

No. employees	No. firms
Less than 10	5
10 - 19	7
20 - 49	10
50 - 99	6
100 or more	5

E. Impacts on Competition

There is little question but that the requirements of 1972 FIFRA as amended would affect competition in the pesticide industry. Small formulators could be forced out and the competitive position of basic manufacturers, who have the volume and resources to comply with the requirements of the Act, would be enhanced. It is recognized that Section 3C1d provides that applicants must file with EPA a full description of tests made and that such data may be made available to other applicants (e.g. formulators) on payment of "reasonable compensation." If agreement is not reached on such compensation, then the Administrator (of EPA) may make such determination. If the owner of the test data does not agree with the level of compensation fixed by the Administrator, then the payment may be determined in the Federal District Court.

If owners of AI test data do not choose to release these data to formulators and do not agree with the Administrator's determination of "reasonable compensation" then the process becomes involved and costly to all parties concerned.

F. Summary

There is little argument to the fact that provisions of 1972 FIFRA as amended will provide data on which reasonable evaluation can be made of the safety of pesticidal materials to humans, animals, birds, fish and the environment in general. The principal argument, from the standpoint of society, is whether the benefits of such regulatory requirements are equal to or exceed the direct and indirect costs involved. This analysis has attempted to estimate the rough order of magnitude of the cost impacts which might result. No attempt has been made to make a comparable evaluation of the benefits. It is not the function of this study to make such a cost-benefit evaluation or to judge the claims for or against the requirements of 1972 FIFRA as amended.

XIV. The Minor Crop Problem

A study by Magness, Markle and Compton 1/ listed over 560 Food and Feed Crops in the United States. Of these, about 350 can be said to be truly minor crops. They listed 160 grasses and legumes; 10 grain crops; 35 major fruit, nut and vegetable crops and 260 minor crops of this category; 16 minor and 8 major oil food crops; and 62 condiments, spices and essential oil crops.

Discussion and correspondence with agronomists and horticulturalists in State Agricultural Experiment Stations indicated that some of these crops could be on the "endangered crops" list if the EPA regulations made pest control too difficult. A few of those are listed here:

strawberries
cranberries
parsley
buckwheat
hops
leeks
Chinese cabbage

guar
wild rice
Christmas peas
mint
sunflowers
safflower
broom corn

millett
sweet sorghum (syrups)
garlic and onions
other small fruits and berries
many condiments
tropical fruits
oil seed

At the present, one cannot say if a minor crop may be endangered by the withdrawal or failure to register a given chemical or formulation. Even when the "restricted" list and new guidelines are available and the Act fully implemented, considerable study will be needed to assess the true impact.

An ad hoc University EPA-USDA Committee submitted a rather comprehensive report on this subject in August, 1973 2/. They pointed out the hesitancy of many pesticide manufacturers to follow through with all the research and testing needed to clear and register those minor use chemicals where there was a questionable chance of profit. They said that already there is urgent need to clear a large backlog of testing and evaluation in order that a needed supply of pesticides may be available for use on minor crops. Without this ready availability of usable pesticides, the variety of food products could diminish and some food product prices could become exorbitant and production of these "minor" crops would be driven overseas.

The loss of materials which were being effectively used against minor crop pests has caused some critical situations. The new regulations requiring strict testing and labeling affects some 360 minor crops, many with 10-15 different pests each.

1/ Food and Feed Crops of the United States, Magness, Markle and Compton, New Jersey Expt. Stat. Bull. 828, 1971 (Product IR-4, IR BUll. #1).

2/ The Development of data required for registration of pesticides for specialty and small acreage crops and other minor uses. Dr. R. J. Sauer, et al., 1973.

Where growers of minor crops are in a climate-soil or market situation that forces production of high-value but low-acreage crops, they are particularly vulnerable to problems associated with possible losses of pesticides specific for use on minor crops. Although the total volume and value of minor crops may be small when compared to basic crops, nevertheless they are of great significance to the individual producers and offer significant variety to the national food supply. Relative importance of minor crops may be illustrated by 7 minor crops shown in Table 32. These data show a minor crop may occupy no more acreage than a good-sized farm or ranch, yet be in high demand and bring very high per acre returns. The data for a major crop, corn, is shown for comparison. The acreage of these 7 crops is 0.3 percent of corn acreage but the gross value is 1.9 percent of gross corn value.

There is considerable fear that when pesticides are withdrawn because of registration and labeling costs and delays, they will be replaced with difficulty and some not at all. No private company can go on developing and producing pesticide chemicals at a loss. As recommended in the Sauer report, some states feel that the government may have to subsidize the cost of testing, evaluating and registering pesticides which have special minor uses or else set up special privileges for minor crops. Section 24-C may provide a possible means for State registration of pesticides for use on minor crops.

It would appear, until more detailed studies can be made, that some of the recommendations made in the Sauer report are worthy of consideration in adopting the revised FIFRA Act and Guidelines to the problems of minor crop uses and minor use pesticides - viz:

1. Utilize multi-discipline groups for constantly reviewing minor crop needs and the needs for registration of minor use pesticides.

2. Use a regional approach to solving minor use problems.

3. Adopt systems of minor crop groupings both for testing and labeling.

4. Establish tolerance limits based on ordinary human activities.

5. Help states and federal agencies develop processes and financial support to develop, test and label needed minor use pesticides where these are needed and where the volume of sales expected offers no profitable return to the manufacturers.

Table 32. Representative minor crops, acreage, production and value, United States, 1973

Name (Common)	Acres	Production Unit	Production Amount	Value* ($000)
Garlic	6,900	cwt.	897,000	$ 11,021
Strawberries	40,860	cwt.	4,773,000	131,592
Cranberries	22,800	barrels	2,100,300	27,616
Mint	82,000	pounds	4,479,000	31,842
Hops	31,400	pounds	54,769,000	41,722
Maple syrup		gallons	1,099,000	9,670
Broom corn	19,300	tons	3,300	1,634
7 Crops - Totals	203,260			$255,097
Corn	61,800,000	bu.	5,600,000,000	$13,300,000

* Average value - 7 minor crops = $1,255/acre, average value corn = $215/acre.
Source: Agricultural Statistics, 1974, USDA.

PART III

ESTIMATE OF ADDITIONAL UPDATE COSTS REQUIRED TO REGISTER NEW ACTIVE INGREDIENTS AND TO REREGISTER EXISTING ACTIVE INGREDIENTS AND PRODUCTS

I. Background

Section 3, 1972 FIFRA as amended, requires that all existing products (estimated to number approximately 35,500) and active ingredients (AI) be reregistered with EPA by October 21, 1976 (40FR28247). Certain exceptions may be made if long-term testing for certain pesticides cannot be completed by this date. The registration requires full compliance with all incremental requirements of 1972 FIFRA as amended, plus all previously existing registration requirements. However, product use history may be such that updating certain requirements may be waived. Thus, the total cost of accomplishing this reregistration would include not only the costs of meeting the incremental reregistration requirements of 1972 FIFRA as amended, but also the "catch-up" costs necessary to update EPA product registration files for all information and tests required for registration. Those registration and reregistration costs associated only with the incremental requirements of 1972 FIFRA as amended, were analyzed in Part II (I) of this report. This part considers the costs of updating product files to meet previously existing (prior to 1972) registration and reregistration requirements.

A. Required Tests and Test Costs

The costs shown are based on commercial laboratory test costs but represent industry's estimates of the amount of testing which will be required to bring all products into compliance with all registration requirements. Table 32 shows data requirements for new registrations and reregistrations and commercial costs for selected tests.

Test costs were obtained from commercial testing laboratories and will vary in relation to the complexity of products tested, the length of the testing period and the number and kinds of test animals used. Costs shown do not include the cost of pesticidal materials furnished nor company administrative costs assosicated with registration or reregistration.

Tests shown in Table 33 are designated as either "required" or "conditionally required." "Required" tests must be conducted on all products; "conditionally required" tests may or may not be required depending on the circumstances under which the pesticide is to be used and the types and degrees of exposures anticipated. In the "conditional requirement" column in Table 32, the letter

Table 33. Data requirements and estimated test costs, pesticide registration

Data Requirements	Estimated cost to perform required tests	New Registrations		Re-registration		Formulation	A.I.	Metabolites
		Reg.	Cond. Reg.	Reg.	Cond. Reg.			
I. Product Hazard								
A. Humans and Domestic Animals								
1. Acute Oral LD-50*	$300-500	X				X	X	X
2. Acute Dermal LD-50*	550	X				X	X	
3. Acute 1^{o} Dermal Irritation*	300	X				X	X	
4. Acute 1^{o} Eye Irritation*	350	X				X	X	
5. Inhalation LC-50**	500-600		X			X	X	
6. Intravenous Routes of Exposure	400-500		X				X	
7. Subacute Dermal Tests	6,000		X			X	X	
8. Subacute Inhalation-90 day	8,000-10,000		X			X	X	
9. Subacute Oral- 90 days (2 species)	30,000-40,000		X				X	X
10. Teratological Studies	6,000-8,000		X		F		X	X
11. Neurotoxicity Studies	1,000		X				X	
12. Metabolism Tests			X				X	
13. Oncogenicity/Feeding Studies	75,000-125,000		X		F		X	X
14. Reproduction Studies	22,000-25,000		X		F		X	X
15. Potentiation Studies			X				X	
16. Re-entry Studies			X		X		X	
17. Reversibility of effects after subacute feeding	30,000-40,000		X				X	

continued.....

Table 33. Data requirements and estimated test costs, pesticide registration (continued)

Data Requirements	Estimated cost to perform required tests	New Registrations Reg.	New Registrations Cond. Reg.	Re-registration Reg.	Re-registration Cond. Reg.	Formulation	A.I.	Metabolites
I. Product Hazard (con't) B. Fish and Wildlife								
18. Avian acute oral LD-50**	1,000	X		X			X	
19. Avian subactue dietary LC-50***	1,500-2,000	X		X			X	
20. Fish Acute Toxicity	600-1,000	X				X	X	
21. Acute toxicity for shrimp/ crabs**	2,400		X			X or	X	
22. Acute toxicity for oyster larvae** or shell deposition			X			X or	X	
23. Reproduction tests on Bobwhite and Mallard	15,000-30,000		X				X	
24. Subacute or chronic fish reproduction studies	32,000-46,000		X				X	
25. Potential hazards relating to use patterns	10,000		X			X		
26. Additional toxicity data**	20,000-45,000		X			X	X	
II. General & Environ. Chemistry A. General Chemistry	82,000-137,400							
1. Quality Control Procedures (all disinfectants)	company perform		X				X	
2. Chemistry of active ingredients - formulation may be required	company perform						X	

** May be either formulated product and/or active ingredient.

*** Avian acute data had been required up until 1971. This may be sufficient for re-registration, and will be reviewed on a case-by-case basis; subacute dietary studies, therefore, may not be required for re-registration.

continued.....

Table 33. Data requirements and estimated test costs, pesticide registration (continued)

Data requirements	Estimated cost to perform required tests	New Registrations Reg.	New Registrations Cond. Reg.	Re-registration Reg.	Re-registration Cond. Reg.	Formulation	A.I.	Metabolites
II. General & Envrmntl. Chem. (continued)								
A. General Chemistry								
3. Basic Manufacturing Process (and Analytical methods)	company perform	X					X	
4. Properties of inerts	"		X			X		
5. Storage stability	"	X				X		
6. Tobacco Residues	"		X				X	X
B. Envrmntl. Chemistry								
7. Field Studies Data	Generally performed by company.	X				X		
8. Soil Metabolism (degrad.)		X					X	X
9. Bound Residues		X					X	X
10. Soil persistence studies	Cost according to complexity	X					X	X
11. Supplemental soil persistence			X				X	X
12. Laboratory leaching studies	Done in conjunction with tolerance and residue work	X					X	X
13. Leaching studies for pesticides with high mobility			X				X	X
14. Hydrolysis rate in pure water			X				X	X
15. Degradation rate in water containing suspending solids			X				X	
16. Degradation studies in sediments			X				X	
17. Translocation			X			X	X	X

continued.....

Table 33. Data requirements and estimated test costs, pesticide registration (continued)

Data Requirements	Estimated cost to perform required tests	New Registration Reg.	New Registration Cond. Reg.	Re-registration Reg.	Re-registration Cond. Reg.	Formu-lation	A.I.	Matabo-lites
II. General & Envrmntl. Chem. (continued)								
18. Livestock & Poultry Drinking Water	Generally performed by company		X				X	
19. Tests Involving Moving Waters			X				X	
20. Fish residue studies		X					X	X
21. Fish natural habitat studies			X				X	X
22. Terrestial wildlife			X				X	X
23. Photodegradation			X				X	
24. Volatilization			X				X	
25. Effects of pesticides on microorganisms		X					X	
26. Effects of microorganisms on pesticides		X					X	
27. Disposal		X		X		X		
28. Runoff studies***							X	X

**** Runoff studies are no longer required on any registrations.

"F" indicates that data may have been submitted in previous registrations for a test and if the results of these previous tests meet guidelines requirements, no further testing is required.

In the case of reregistrations, the amount of "update" testing which may be required, will generally be related to the last date of registration for the AI or the product. For products which have been recently registered or reregistered, it would be presumed that only minimal "update" testing would be required to comply with full registration requirements of EPA after October 21, 1976. If the product had been registered earlier with a minimum of test data, substantial updating and "catch-up" testing may be necessary.

Estimates of the costs for performing the tests required for general and environmental chemistry are not specified since the magnitude of the analytical work and the costs of such analyses will vary from product to product. Most companies prefer to do the chemical analyses in their own laboratories since for many products, patents may be pending and they do not want to divulge proprietary information on the product.

II. Estimated Additional Update Costs to Industry for Registration and Reregistration of Pesticides

This section attempts to develop estimates of the costs to industry for "updating" existing pesticide registrations and for new registrations to meet total registration requirements of EPA by October 21, 1976.

The establishment of these costs is, at best, an approximate process. Costs shown are based on unit costs of performing specified tests in commercial laboratories, estimated in-house (company lab) costs for general and environmental chemistry analyses and industry estimates of the added costs of updating pesticide registrations and new registrations as a result of both quantitative and qualitative increases in testing required above that which would have been required in 1972. All costs are expressed in 1975 dollars, thus the added costs are intended to represent added costs resulting from increases in the number and types of tests required as compared to 1972 and changes in the levels of testing required for specific tests.

As stated earlier, this estimate of costs is not intended to represent the purely incremental costs associated only with the added test requirements of 1972 FIFRA as amended. Rather, these costs are estimates of the additional costs of updating (including "catch-up" costs) registrations for existing products as compared to 1972 plus the added costs of registering new products again as compared to similar costs in 1972.

The situation is complicated by a variety of factors:

1. The use of 1972 as a baseline period to estimate added costs of registration. Testing requirements and costs have been increasing continuously over the years. However, pending the implementation of 1972 FIFRA as amended in 1976, there have been fewer changes since 1972. The year 1972 was assumed as the baseline year since registration requirements existing in 1972 provide the most recent base on which added costs of reregistration and registration can be estimated.

2. The types and complexity of products registered. An attempt has been made to recognize this factor by developing estimates for simple, moderately complex and complex products.

3. The extent, currency and availability of test data on active ingredients and the number of AI involved in formulations.

4. The applications proposed for the products and the exposures which may result.

5. The "Guidelines" and "Regulations" for registration and reregistration of pesticides establish the basic framework specified, but the actual tests required may vary with availability of existing test data and the judgment of the EPA Product Manager regarding the additional data which may be needed.

A. Additional Costs for Registration of New Active Ingredients

Table 34 shows the estimated added costs to the pesticide industry for registration of a new active ingredient as compared to 1972 registration costs for active ingredients. The estimates shown were developed a variety of sources, including:

* Discussions with EPA personnel, particularly in the Registration Division

* Discussion with individuals responsible for product testing of pesticides in pesticide manufacturing firms and pesticide formulator companies

* Discussions with private testing laboratories

* Discussions with pesticide specialists in university agricultural experiment stations and extension services and the U. S. Department of Agriculture

Information furnished by EPA indicates that approximately 10 new Active Ingredients are registered per year. Personnel in the Registration Division estimate that 3 would be classed as "simple" AI, 4 as "moderately complex" and 3 as "complex". As shown in Table 34, the additional costs, above the 1972 base, estimated for the registration of a new active ingredient, are as follows:

Type of AI	Estimated Added Cost per AI	Est. number AI per year	Total Added Annual Cost
Simple	$275,000	3	$ 825,000
Mod. complex	500,000	4	2,000,000
Complex	975,000	3	2,925,000
Total	--	10	$5,725,000
Minus 1972 FIFRA incremental costs			- 1,600,500
Estimated additional update costs			$4,124,500

Of this amount $1,600,500 would be accounted for by the six new tests required by 1972 FIFRA as amended (see page 36 this report). The balance of $4,124,500 represents the added costs of other tests required on new AI above the level of testing required prior to 1972.

B. Additional Costs - Registration of New Formulations

In addition to the registration of new active ingredients, each year there are registered (for the first time) new formulations or new products. These are entirely new products--not amended uses of existing products. These products represent new combinations or concentrations of AI's with other inert materials and are issued new labels by EPA. In most instances, registration profiles for the active ingredients in these products will be available, but additional tests are required for the formulations. The cost of registering these products will vary substantially depending on their complexity, their applications and the availability of AI information. EPA estimates that approximately 5,500 such new formulations are registered annually. It is expected that the registration of these new products will require data similar to that required for reregistration of old products where product files have not been updated, but where basic AI information is available.

Since there is a normal attrition of old products and replacement with new products, it is assumed that the costs for registration of new formulations would be accounted for in the total costs shown for reregistration of the 35,500 products as discussed in Part D. of this report.

C. Additional Costs - Reregistration of Active Ingredients

1. Number of active ingredients - EPA estimates that there are approximately 1,400 AI currently registered. However, it is estimated that approximately 300 of these are natural oils, solvents or other

Table 34. Estimated total additional cost of data development to register a new active ingredient (new chemical) 1972 compared with 1976 (in 1975 dollars)

Degree of difficulty and Year	Test costs (in 1975 dollars)[1/] [2/]				Additional test costs due to new or expanded requirements since 1972	Additional costs above 1972 level	Distribution	Total added cost
	Toxicology	Biochemistry (tolerance, residue environment feeding)	Efficacy	Total				
Simple[3/] 1972	$175,000	$350,000	$500,000	$1,025,000	$ 525,000			
Simple 1975	275,000	500,000	700,000	1,475,000	800,000	$275,000	3	$ 825,000
Moderately complex[4/] 1972	325,000	600,000	750,000	1,675,000	950,000			
Moderately complex[4/] 1976	500,000	900,000	800,000	2,200,000	1,450,000	500,000	4	2,000,000
Complex[4/] 1972	450,000	800,000	750,000	2,000,000	1,300,000			
Complex[4/] 1976	700,000	1,500,000	900,000	3,100,000	2,275,000	975,000	3	2,925,000
Total								5,725,000
Minus 1972 FIFRA incremental costs								-1,600,500
Estimated additional update costs								$4,124,500

[1/] Does not include losers; i.e., products for which registration is dropped.

[2/] Costs are based on experience of small, medium and large basic manufacturers of pesticides.

[3/] Simple product - Toxicology is not complicated, crop tolerance establisned on basic chemical and one metabolite.

[4/] More complicated toxicology and increasing and more difficult metabolite.

chemicals which will need no further data. Thus, it is believed that there will remain approximately 1,100 AI for which registrations will need to be updated.

2. Additional reregistration requirements - The specific requirements for reregistration of AI will include test data for teratogenic, oncogenic, chronic feeding and reproduction studies and, within the next five years, mutagenic and chronic fish residues (see page 36 and 37 this report). However, these 1972 FIFRA incremental tests will be required only on those AI (estimated to number approximately 300) where hazards associated with these test areas are believed to exist. This generally includes those AI where FDA tolerances are required. The other additional costs which will be incurred by manufacturers of AI will not be solely attributable to 1972 FIFRA as amended, but will represent "catch-up" or updating requirements to bring their AI in conformity with the total range of tests and levels of testing required by EPA for reregistration of these AI. Although the general requirements for test data to support reregistration of AI were specified in Table 33, the final range of testing required will be determined by a reviewer and the appropriate product manager of EPA. However, manufacturer technical personnel responsible for product registration are generally aware of the tests which will be required for their AI's.

Since the costs of reregistration will vary, by product, depending on the type of AI and the date of the last registration, AI were divided into three classes for the purpose of calculating reregistration costs.

Class I - Basic manufacturers of proprietary AI and older AI that have been kept up-to-date.
These manufacturers who recently labeled, or applied for amended labels, on a yearly or more frequent basis during the past 5 to 7 years, will generally face additional data requirements for reregistering their AI. For example, some of these AI were registered on a 90-day feeding trial whereas new requirements may specify a 2-year feeding trial along with other additional test data.

Class II - Basic manufacturers with AI 10 years old or older who have not kept registrations of their proprietary AI up-to-date. This group will need all of the data required by 1972 FIFRA plus substantial "catch-up" testing to bring these products up to current registration requirements.

Class III - Basic manufacturers who produce non-proprietary AI. There is less incentive for manufacturers of these AI to keep registration profiles up-to-date. As a result, this class may require more extensive additional, or "catch-up," testing than Classes I or II.

3. Estimated additional AI reregistration costs - Table 35 presents estimates of the costs which industry anticipates will be required to update AI registration files and to provide data on the additional tests required by 1972 FIFRA as amended. It should be emphasized that the costs shown include all costs concerned with reregistration of AI, including "catch-up" costs plus those which are purely incremental to 1972 FIFRA as amended.

   The cost estimates shown were developed through contacts and discussions with industry representatives responsible for registration of AI produced by their firms. The estimates reflect their experience with registration requirements for the AI for which they are responsible and their judgment of the costs which they would incur in accomplishing reregistration of these AI as required by the Act.

   As shown in Table 35, estimated total cost additional update exclusive of 1972 FIFRA incremental requirements of $33,325,000 for accomplishing reregistration of 1,100 AI is $243,816,000.

D. Additional Costs - Reregistration of Formulations

Section 3, 1972 FIFRA as amended, requires that all existing formulations (products) be reregistered in conformity to the Section 3 Guidelines and Regulations, 1972 FIFRA as amended. Although there are no incremental registration requirements for formulations resulting solely from the provisions of 1972 FIFRA as amended (see page 32 of this report) provided that test data on AI are available, industry representatives contacted during the study estimated the costs which would result from the needs for updating existing product files to meet current EPA registration requirements. Again, these costs are not solely incremental due to provisions of 1972 FIFRA as amended, but rather represent "catch-up" costs which would be incurred due to the requirement that all products be reregistered by October 21, 1976.

1. Number of formulations registered - Based on a product run of registered labels on June 5, 1975, EPA reported that there were 30,126 products with Federal registration in their files. Of these, 42 percent, or 12,727, are composed of a single active ingredient and 58 percent, or 17,379, are multi-active ingredient products. Distribution of these products, by number of active ingredients per product, was as follows:

Table 35. Estimated additional costs for reregistration of active ingredients as required by 1972 FIFRA as amended 1/

Class of AI	Manufacturer's Est. of per AI reregistration cost	Number of AI to reregister	Total estimated reregistration cost
	($000)		($000)
Class I - recent registration, proprietary	$150 - 300, avg. 200	200	$ 40,000
Class II - not recent registration, proprietary	200 - 500 avg. 300	300	90,000
Class III - non-proprietary	200 - 1,200		
pesticides	avg. 300	200	60,000
disinfectants	avg. 200	400	80,000
Total		1,100	$270,000
Less estimated incremental costs solely attritutable to 1972 FIFRA 1,100 AI at $23,804 avg. cost 2/			26,184
Estimated update costs, net of 1972 FIFRA incremental requirements			$243,816

1/ Source: Estimates of industry personnel responsible for development of test data for registration of AI.

2/ Source: Page 37, this report.

No. AI in formulation	Number of products
1	12,747
2	7,769
3	4,704
4	2,844
5	1,199
6	491
7	206
8	96
9	30
10	22
More than 10	18
Total	30,126

There are also a large number of products (13,000-15,000) registered under State labels which will have to be brought up to Federal label standards. Considering both Federal and State-labeled products and allowing for duplication and for products which may be dropped, it is assumed that there will be 35,500 products (formulations) to reregister.

From this total of 35,500 registrations, 1,400 AI should be subtracted, leaving a total of 34,100 products. It is recognized that certain of these products will require little or no updating. If it is assumed that 10 percent of the total fall in this category, removing an additional 3,400 products, leaving a total of 30,700 to be reregistered.

2. Reregistration costs - formulations - The analysis of the costs of reregistering pesticide formulations is based on the specific assumption that no additional testing requirements (teratological, oncogenicity, chronic feeding, reproduction, mutagenesis, chronic fish residues) are imposed by 1972 FIFRA as amended on formulations provided that registration requirements have been met by all active ingredients used in the formulation of these products (Federal Register Vol. 40, No. 129, Thursday, July 3, 1975, page 28248). Given this assumption, then the additional costs of reregistering formulations would be limited to "catch-up" testing required to update product registration files to conform to additional tests or levels of testing which have been instituted since 1972.

Given a five-year registration life for pesticides, formulators were asked to estimate the costs for reregistration of their product lines. Contacts were made with 17 formulators representing 1,334 products. Responses indicated that, if only update testing, excluding the new requirements of 1972 FIFRA as amended which apply only to active ingredients, the average, per product update cost for requirements imposed since 1972 would be approximately $4,500 per product.

On this basis, the reregistration of 30,700 formulations would represent an added cost to the industry of $138,150,000.

E. Summary - Additional Costs of Registration or Reregistration, Exclusive of 1972 FIFRA Incremental Costs

The objective of this analysis has been to estimate the added costs of registering and reregistering pesticides as compared to similar costs which would have been incurred as a result of tests and levels of testing required prior to 1972. These costs include two separate parts.

* Incremental costs which are solely associated with additional tests required by 1972 FIFRA as amended.

* Other "catch-up" costs required for updating product registration files to meet current EPA registration requirements.

These costs are further divided into:

* "One-time" costs associated with the reregistration of all existing active ingredients and formulations by October 21, 1976 as required by 1972 FIFRA as amended.

* Reoccurring, annual costs associated with the added costs of registering "new" chemicals.

A summary of these added costs associated with registration and reregistration is shown in Table 36.

Table 36. Summary, additional update costs above 1972 test requirements, associated with registering and reregistering pesticides as required by Section 3, 1972 FIFRA as amended

Cost Item	Amount
A. "One-time" costs	
1. Reregistration	
a. AI, update and new requirements	$243,816,000
b. Formulations, update only	138,150,000
c. Total estimated reregistration costs	$381,966,000[1]
B. "Continuing" annual costs[2]	
1. Registration of new AI	$ 4,124,300[3]

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[1] In addition to these costs, there would be an added cost of $68,525,000 associated with those reregistration requirements solely incremental to 1972 FIFRA, including $33,325,000 in incremental reregistration costs and $35,200,000 associated with label change costs.

[2] In addition to registration costs of new AI, an indirect cost will result from increased costs of State registrations, projected to increase to $300 per product from present $100. This would result in an annual cost increase of $7,100,000 for 35,500 products.

[3] In addition, there would be $1,600,500 added cost associated with those registration requirements solely related to incremental testing requirements of 1972 FIFRA as amended.

III. Economic Impacts of Additional Update Registration and Reregistration Costs on Users of Pesticides

This analysis parallels the analysis of the user impact of those incremental costs solely attributable to the specific requirements of 1972 FIFRA as amended. The costs shown are applicable only to Section 3, but includes only those "catch-up" or update costs above levels existing in 1972, necessary to complete product files for registration or reregistration by October 21, 1976. The estimated costs are as follows:

Cost Item	Costs attributable to "update" requirements 1/
A. "One-time" update costs	
1. Reregistration, AI	$243,816,000
2. Reregistration, formulations	$138,150,000
3. Total "one-time" costs	$381,966,000
B. "Continuing" annual costs	
1. Registration, new AI	$ 4,124,500

1/ Does not include 1972 FIFRA incremental costs nor label change costs.

As was stated earlier, additional registration and reregistration costs were assumed to be borne by users in proportion to their use of pesticides as follows:

Category	% of Total Pesticide Use
Agriculture	59.00%
Industry	21.52
Households	16.25
Government	2.91
Unallocated	0.32
Total	100.00%

Manufacturer-retailer price spreads of 1.5 were used for all user categories except government where a spread of 1.0 was assumed.

The annual cost impacts on users of pesticides resulting from the added costs of registering and reregistering pesticides as compared to 1972 baseline costs are shown in Table 37.

Table 37. Estimated annual economic impacts on pesticide users resulting from additional update pesticide registration and reregistration requirements

User group		Cost Source	Calculations	Estimated annual cost
1. Agriculture	a.	Manufacturers' pass-through of additional, annual costs of registering new active ingredients	$4,124,500 x 0.59	$ 2,433,455
	b.	Manufacturers and formulators costs of reregistering pesticides, amortized over 10 years at 10%	$381,966,000 x 0.59 at 10%, 10 years	36,676,302
	c.	Wholesaler, retailer price spread on items a & b	$ 39,109,757 x 1.5	58,664,635
	d.	Total annual cost to agricultural users		$ 97,774,392
2. Industry	a.	Manufacturers pass-through of additional, annual costs of registering new active ingredients	$4,124,500 x 0.2152	887,592
	b.	Manufacturers and formulators costs of reregistering existing pesticides, amortized over 10 years at 10%	$381,966,000 x 0.2152 at 10%, 10 years	13,377,522
	c.	Wholesaler-retailer price spread on items a & b	$ 14,265,114 x 1.5	21,397,671
	d.	Total annual cost to industrial users		$ 35,662,785
3. Households	a.	Manufacturers' pass-through of additional, annual costs of registering new active ingredients	$4,124,500 x 0.1625	670,231
	b.	Manufacturers and formulators costs of reregistering existing pesticides amortized over 10 years at 10%	$381,966,000 x 0.1625 at 10%, 10 years	10,101,521
	c.	Wholesaler-retailer price spread on items a & b	$10,771,752 x 1.5	16,157,628
	d.	Total annual cost to household users		$ 26,929,380
4. Government	a.	Manufacturers' pass-through of additional costs of registering new active ingredients	$4,124,500 x 0.0291	120,023
	b.	Manufacturers and formulators costs of reregistering existing pesticides amortized over 10 years at 10%	$381,966,000 x 0.0291 at 10%, 10 years	1,808,949
	c.	Wholesaler-retailer price spread on items a & b	$1,928,972 x 1.0	1,928,972
	d.	Total annual cost to government users		$ 3,737,921
5. Total annual cost to all users				$164,104,478

In summary, the annual user costs are estimated as follows:

Agricultural users	$ 97,774,392
Industrial and institutional users	35,662,785
Household users	26,929,380
Government users	3,737,921
Total annual cost to users	$164,104,478

IV. Economic Impacts of Additional Registration and Reregistration Costs on Consumers

This analysis parallels that of Section XII, Part II of this report which was concerned with the economic impacts on consumers resulting solely from the incremental requirements of 1972 FIFRA as amended. However, here consideration is limited to the economic impacts associated only with Section 3 registration requirements, but the costs include both those requirements which are specifically incremental as a result of 1972 FIFRA as amended plus industry estimates of "catch-up" costs necessary to update other tests required for reregistration and to meet additional requirements imposed since 1972.

Assuming that the incremental costs to the farmer resulting from the additional costs of registration and reregistration (above 1972 levels) are passed forward through the marketing system, that fresh packers and processors profits are maintained and that gross margins of wholesalers and retailers are also maintained, then the impact on consumer food prices of a $114,870,300 additional cost to agriculture would be approximately as follows:

1.	Additional cost to agriculture	$ 97,774,392
2.	Plus packers' and processors' profits on sales of 3 percent	2,933,232
3.	Cost to wholesalers	$100,707,524
4.	Plus wholesalers margins on sales of 5 percent	5,035,376
5.	Cost to retailers	$105,742,900
6.	Plus retailers' margins on sales of 20 percent	21,148,580
7.	Equals total additional cost to consumers association with registration and reregistration of pesticides as required by Section 3, 1972 FIFRA as amended	$126,891,480

The cost to consumers, shown above, does not include those direct household user costs estimated in Section III of this report to be $26,929,380. In addition, the consumer, as a taxpayer, will bear the increased costs to government, $3,737,921. If these are added to these food-derived costs, the total additional cost to consumers, arising from the additional annual costs of registration and reregistration, becomes $157,558,781.

V. Inflationary, Energy, Employment, Productivity and Competition Impacts of Additional Costs of Registration and Reregistration of Pesticides

The inflationary energy, employment and summary impacts resulting specifically from incremental requirements of 1972 FIFRA as amended were discussed in Section XIII, Part II of this report. The general nature of these impacts as related to additional "catch-up" costs of registration and reregistration as discussed in Part III, would be similar.

	"One-time costs" (000)	"Continuing costs" (000)
Costs associated with "catch-up" costs required for registration and reregistration	$381,966	$4,125

Energy impacts could be increased if, as a result of increased registration and reregistration costs, a greater number of pesticides are dropped (not reregistered) and greater dependence on mechanical controls, particularly mechanical tillage in agriculture, is required.

If increased registration and reregistraiton costs lead to abandonment of pesticides, then additional decreases in productivity would result as farmers and industry are forced to resort to less efficient control systems.

Employment impacts would be increased, if as a result of product abandonment due to increased registration costs, formulators restrict production or go out of business entirely.

Competition would be reduced as smaller formulators would be impacted to a greater relative extent than would be basic manufacturers or large formulators.

PART IV

SUMMARY - COSTS AND COST IMPACTS

The study has had as its primary objective the development of cost increases which would result from the implementation of the requirements of specific sections of 1972 FIFRA as amended.

An attempt was made to recognize those costs which are solely incremental due to unique requirements of 1972 FIFRA as amended and also those "update" costs, which would be incurred by industry in updating product test data to meet pre-1972 FIFRA registration requirements.

Cost impacts were developed for:

1. The pesticide industry - Table 38
2. User groups - Table 39
    a. agriculture
    b. industry
    c. households
    d. government
3. Consumers - Table 40

A. Cost Impacts - Pesticide Industry

Table 38 summarizes the estimated cost impacts on the pesticides industry. The industry is defined to include manufacturers, formulators, distributors and dealers and applicators. Also included is an estimate of the value of excess pesticides which might result from inability of farmers to apply at "less-than-label" rates.

The major costs are associated with registration requirements. The incremental test requirements due solely to the new tests required by 1972 FIFRA would add a one-time cost of $68.5 million to complete these tests on all existing active ingredients and from then on an additional annual cost (above pre-FIFRA requirements) of $1.6 million would result. However, 1972 FIFRA also requires reregistration of all currently registered active ingredients and formulations (35,500 in total). Although the cost of updating these 35,500 product files to meet pre-1972 FIFRA test requirements is not an incremental cost due to 1972 FIFRA, industry anticipates that this updating will result in a cost of $382 million to update all product files and that an annual cost of $4.1 million above test requirements pre-1972, will continue.

Table 38. Summary, direct incremental 1972 FIFRA and "update" costs associated with the implementation of specified sections of 1972 FIFRA as amended

1972 FIFRA Sec.	Description	Estimated 1972 FIFRA Incremental Costs One-time	Estimated 1972 FIFRA Incremental Costs Annual	Estimated Additional "update" One-time	Estimated Additional "update" Annual
		($000)	($000)	($000)	($000)
3	Registration of pesticides	$ 68,525	$ 1,600	$381,966	$4,124
4	Use of restricted pesticides certified applicators	45,168	28,739	-	-
5	Experimental use permits	-	25,000	-	-
7	Registration of establishments	-	3,534	-	-
8	Books and records	-	5,120	-	-
9	Inspection of establishments	-	185	-	-
12-G	Use of registered pesticide in a manner inconsistent with its labeling	-	19,200	-	-
19	Disposal and transportation	-	27,700	-	-
	Total	$113,693	$111,078	$381,966	$4,124

Other major cost items are:

1. Applicator certification (Section 4)
    a. $45 million one-time to train and certify 1.5 million farmers as private applicators and 192,000 commercial applicators.
    b. $28.7 million annually to maintain applicator training and to provide for monitoring and enforcement of the certification requirements.

2. Experimental use permits (Section 5) - $25 million annually--due to the increase in the number of permits, with accompanying testing requirements, as federal and state agencies will be required to get permits for extended field testing.

3. Inability to apply pesticides at "less-than-label" rates (Section 12-G). Estimated cost of $19.2 million due to excess amounts of pesticides used above effective treatment requirements. No allowance has been made for crop damage.

4. Disposal costs - $27.7 million (Section 19) - Due to new disposal requirements of 1972 FIFRA as amended.

B. Cost Impacts - User Groups

Table 39 summarizes annual cost impacts on user groups due to direct incremental requirements of 1972 FIFRA as amended and due to "update" costs associated with registration.

One-time costs have been discounted to present values over a 10-year period at 10 percent. Costs shown include both direct costs and dealer mark-ups or margins which would become a part of the price to the user.

Agriculture bears the greatest cost burden, accounting for over 60 percent of the total user costs. Industry accounts for approximately 20 percent, households 15 percent, government 4 percent and a small amount is unallocated.

The annual user costs which are projected as solely incremental to 1972 FIFRA ($165.4 million) were approximately equal to the costs associated with other "update" registration requirements ($164.1 million).

Table 39. Summary, annual cost impacts on user groups due to direct incremental requirements of 1972 FIFRA and to "update" costs of registration, 10-year period

User group	Direct incremental cost, 1972 FIFRA	"Up-date" costs associated with registration
	($ millions/yr)	($ millions/yr)
Agriculture	$105.5	$ 97.8
Industry	32.1	35.7
Households	24.2	26.9
Government	3.6	3.7
Total	$165.4	$164.1

Table 40. Summary, annual cost impacts on consumers due to direct incremental requirements of 1972 FIFRA and to "update" costs of registration

Consumer impact source	Direct incremental cost, 1972 FIFRA	"Up-date" costs associated with registration
	($ millions/yr)	($ millions/yr)
Consumer food prices	$136.9	$126.9
Direct household costs	24.2	26.9
Costs to government	3.6	3.7
Total consumer impact	$164.7	$157.5

C. Cost Impacts - Consumers

Annual cost impacts on consumers due to direct incremental requirements of 1972 FIFRA and due to "update" costs associated with registration are shown in Table 40.

The annual incremental costs ($164.7 million) are approximately equal to the annual costs due to "update" registration requirements ($157.5 million).

The major impact will be on food prices, over 80 percent of the total. Direct costs to households make up approximately 16 percent and costs to government--ultimately paid by the consumer as the taxpayer--make up the balance.

PART V

LIMITATIONS OF THE ANALYSIS

The analysis of the cost impacts of an act as complex as 1972 FIFRA as amended is necessarily limited by lack of data and by the assumptions which are required to compensate for such situations. In addition, the Act has not been fully implemented and certain sections of the Act are being modified by proposals to change the basic legislation or by developments in the guidelines and regulations designed to implement the Act. Further, the regulations as proposed are, in themselves, subject to interpretation by those charged with the responsibility for administering the Act.

In spite of these general limitations, it is necessary that an attempt be made to estimate the cost impacts on the pesticide industry, on pesticide users and on consumers which would be anticipated as a result of the implementation of 1972 FIFRA as amended.

A. Major Limitations

1. The analysis was limited to specified sections of 1972 FIFRA as amended--those sections which would have direct cost impacts. Sections analyzed included 3, 4, 5, 7, 8, 9, 12-G, 19 and 24-C. It is recognized that other sections of the Act, for example Section 6, Administrative Review; Suspension, can have cost impacts, but the incidence of such impacts would result from specific actions, e.g. suspension of dieldrin and aldrin, and such impacts must be considered on a case-by-case basis.

2. A major difference exists, in terms of cost impacts, between those requirements of the act which are solely incremental to 1972 FIFRA as amended and between those costs which represent actions not uniquely required by 1972 FIFRA as amended and which were established by prior legislation and/or regulation, but which now must be fully met in order to comply with the total requirements of 1972 FIFRA as amended. This problem was particularly important in considering impacts of Section 3 - Registration and Reregistration. Although the "incremental requirements" due solely to 1972 FIFRA as amended can be identified and their costs estimated, a greater problem exists in evaluating the "update or catch-up" costs necessary to update product registration files to meet total requirements for reregistering all active ingredients and formulations by October 21, 1976 (or such date as may be specified) as required by Section 3. Those costs due solely to the incremental requirements of 1972 FIFRA as amended are estimated in Part II of this report; additional "update or catch-up" costs required to update AI and formulation files for reregistration, were developed from industry estimates and are presented in Part III.

3. The requirements for test data for registering and reregistering both active ingredients (AI) and formulations will vary substantially from pesticide to pesticide. 1972 FIFRA incremental requirements will apply only to active ingredients and test requirements on which costs were calculated were based on a sample of 660 registrations, out of a total of 1,409 AI, including all AI with FDA tolerance. Requirements for "update" testing for reregistration of both AI and formulation were based on contacts with pesticide manufacturers and formulators and reflect their estimates of costs they would incur.

4. Costs of performing specific tests vary with the source of the testing --private laboratories vs. "in-house", company testing, and allocation of registration test costs as opposed to other laboratory functions within company R&D programs could not be made with precision. For most major tests, private laboratory test costs were used. In addition, a 10 percent addition was made to take into account the cost of pesticides used and company administrative costs incurred in administering the testing program and registration procedures.

5. Classification of pesticides by EPA into "restricted" or "general use" categories was not complete when this analysis was made.

6. Estimates of Section 4 Applicator Certification costs were based on cost estimates furnished by State agricultural extension services (training) and State regulatory agencies (certification and monitoring/enforcement) and reflect their judgment regarding the costs they anticipate. However, most of these states do not have approved programs in place. The number of applicators to be certified was based on estimates by EPA (farmers) plus estimates from industry trade associations of the number of commercial applicators and the categories in which they would be certified.

7. The cost impact of Section 5, Experimental Permits, was based on estimates from EPA (number of experimental permits issued--now and in near future), State Agricultural Experiment Stations and pesticide manufacturers. A key assumption made was that all extended field testing done by State Experiment Stations and Extension Services (as opposed to pure experimentation) would require experimental permits. The proportion of pesticides field tested which would survive and be registered was based on estimates by pesticide manufacturers and State Experiment Stations as was the cost of testing required to get an experimental permit.

8. Section 7 - Registration of Establishments and Section 8, Books and Records. Estimates of the costs associated with producing and maintaining the required pesticide reports and records were developed largely from discussions with industry personnel responsible for administering and maintaining these functions. Estimates of the number, types and sizes of firms and establishments were developed from information from

EPA (number of firms and establishments), from industry trade associations and Census data (number of firms by type and size).

9. Section 9 - Inspection of Establishments. - Number of inspections and samples taken were estimated by EPA. Escort costs and costs of replacing samples were based largely on information from industry sources.

10. Section 12-G, Application at Less-Than-Recommended Rates. Contacts were made with Agricultural Experiment Stations and Agricultural Extension Services throughout the United States regarding (1) their willingness to make recommendations for "less-than-label" rates and (2) the existence of situations where such rates might apply. Estimates were developed only for the costs of excess pesticides which would be used if "less-than-label" rates could not be used. No allowance was made for possible damage to growing or follow-on crops.

11. Section 19, Disposal. Estimates were developed by DPRA for disposal costs for farmers. Contacts were made with commercial applicators to develop a basis for estimates of disposal costs for this group. Further contacts were made with pesticide manufacturers, formulators and distributors to determine the amounts of pesticides disposed of and estimates of disposal costs.

12. Estimates of relative amounts of pesticides used by agriculture, industry, households and government were obtained from published research, mainly The Pesticide Review, ASCS, USDA, and Farmers Use of Pesticides in 1971, ERS, USDA, Agricultural Economic Report No. 252. These data were for 1971, but it is assumed that the relative importance of pesticide use by each user group has remained approximately the same.

13. Price spreads between pesticide manufacturers and farmers were calculated based on equivalent prices for major pesticides as reported by the "Chemical Market Reporter" and "Agricultural Prices," ERS, USDA for comparable time periods. These prices were checked with other series and the price differential used appears realistic.

14. Because of the absence of applicable research data, assumptions were made regarding the probability and the ability of industry and farmers to pass costs forward to users and consumers. In general, it was assumed that in the long-run, costs would be passed forward to users and, insofar as pesticides represent inputs to consumer products, increased pesticide costs would be passed forward to the consumer in the form of higher product prices through normal marketing channels and with the maintenance of normal marketing margins. In the case of agricultural products, most of this cost transfer would be indirect, through the supply function as farmers adjust production to cost-price relationships.

B. Validity of the Analysis

The assumptions and limitations detailed above indicate the problems which were encountered in making the estimates on which this analysis was based. However, every effort was made to secure reliable data, to check such data with more than one source, and to make assumptions which were logical and realistic in terms of the requirements and costs associated with the sections of 1972 FIFRA as amended which were studied in this project.

With these limitations, it is believed that the cost impacts shown are realistic in terms of their nature, their direction and the general order of magnitude indicated.